

UNITED STATES SIGNAL SERVICE MONTHLY WEATHER REVIEW.

VOL. XVIII.

WASHINGTON CITY, AUGUST, 1890.

No. 8.

INTRODUCTION.

This REVIEW is based on reports for August, 1890, from 2,340 regular and voluntary observers. These reports are classified as follows: 168 reports from Signal Service stations; 121 reports from United States Army post surgeons; 5 reports of rainfall observations of the United States Geological Survey in Arizona and New Mexico; 1,498 monthly reports from state weather service and voluntary observers; 26 reports from Canadian stations; 151 reports through the Central Pacific Railway Company; 371 marine reports through the co-operation of the Hydrographic Office, Navy Department; marine

reports through the "New York Herald Weather Service;" monthly weather reports from the local weather services of Alabama, Arkansas, Colorado, Illinois, Indiana, Iowa Weather and Crop Service, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Meteorological Report of the Missouri State Board of Agriculture, Nebraska, Nevada, New England, New Jersey, New York, North and South Dakota, Ohio, Oregon, Pennsylvania, South Carolina, Tennessee, and Texas, and international simultaneous observations. Trustworthy newspaper extracts and special reports have also been used.

CHARACTERISTICS OF THE WEATHER FOR AUGUST, 1890.

An important feature of the month was the West India cyclone which moved from east of the Windward Islands to northwest of Bermuda from the 27th to 31st, with winds of hurricane force and loss of life and shipping.

In the west part of the upper lake region and the upper part of the Mississippi Valley the month was the coldest, and at stations on the middle California coast and in the lower Rio Grande valley it was the warmest August on record. The greatest departures below the average temperature for August were noted in the upper Mississippi valley and thence northward to the British Possessions, where they exceeded 3°, and the greatest departures above the average occurred at Sydney, C. B. I., and San Francisco, Cal., where they exceeded 2°. The highest temperature reported by a regular station of the Signal Service was 110° at Yuma, Ariz., and by a voluntary observer 120° at Volcano Springs, Cal. The lowest temperature reported by a regular station of the Signal Service was 30° at Saint Vincent, Minn., and by a voluntary observer 24° at Alma, Colo., and Bonanza, Idaho. Killing frost occurred on the 16th in Saint Lawrence Co., N. Y.; on the 22d at Saint Vincent, Minn., and Saint Lawrence, S. Dak.; on the 23d at Manton, Mich.; and on the 24th at Alpena, Mich. The frost of the 16th in Saint Lawrence Co., N. Y., was about one month earlier; that of the 22d at Saint Vincent, Minn., was about 10 days earlier; that of the 22d at Saint Lawrence, S. Dak., was about two weeks earlier; and that of the 23d at Manton, Mich., and of the 24th at Alpena, Mich., was about one week earlier than the average date of first killing frost in the respective localities.

The rainfall was unevenly distributed over the interior and eastern parts of the country, and large excesses and marked deficiencies occurred in limited and irregularly distributed areas. The greatest excess occurred in west-central Arkansas, where it exceeded 8.00 inches at Fort Smith, nine years record. In the middle Saint Lawrence valley the excess above the average for August was more than 5.00 inches at Montreal, and more than 4.00 inches at Quebec, and on the south-central coast of Nova Scotia, on the immediate Atlantic coast from Norfolk, Va., to Atlantic City, N. J., and in the Mississippi Valley from Vicksburg, Miss., to Cairo, Ill., it was more

than 3.00. The greatest deficiency occurred on the Georgia and east-central and extreme west Florida coasts, where it was more than 4.00 inches, and the deficiency exceeded 2.00 inches at stations on the south New England coast, along the south Atlantic and Florida coasts, and in the lower Rio Grande, upper Mississippi, and Missouri valleys. At stations in New Hampshire and Vermont, at Statesburgh, S. C., in west-central Arkansas, east-central Colorado, and in the south and west parts of the southern plateau the rainfall was the heaviest ever reported for August. On the north Pacific coast the rainfall was about one-half greater, and in the Ohio Valley and Tennessee, the southern plateau, and the middle Atlantic states it was one-fourth to one-half greater than the average; while on the south Pacific coast about one-fifth, in the Rio Grande Valley about one-fourth, and at Key West, Fla., in the northern plateau, the Missouri Valley, extreme northwest, and in the south Atlantic states two-fourths to three-fourths of the usual amount of rainfall was reported. Light snow flurries were reported along the upper Saint Marie River, Mich., on the 9th, and in Dauphin, Northampton, and Northumberland counties, Pennsylvania, on the 23d.

Destructive storms were reported in Kentucky on the 1st; in North Carolina, Virginia, and Iowa on the 2d; in Iowa, southern Minnesota, South Dakota, central and east-central Wisconsin, Michigan, Indiana, and New York on the 3d; in Michigan and Arizona on the 4th; in southern California and New Brunswick on the 5th; in Iowa on the 6th; in Minnesota and Arizona on the 7th; in Michigan, Wisconsin, and Florida on the 8th; in Tennessee on the 9th; over Long Island Sound, and in New Jersey, New York, and South Dakota on the 10th; in east-central Colorado on the 14th; in Missouri on the 16th; and in Ohio on the 17th. On the 19th a destructive tornado occurred at Wilkes Barre, Pa., killing sixteen persons, and destroying property to the value of about \$600,000. Destructive storms occurred in central Texas on the 20th; and in Maryland, Pennsylvania, and New York on the 21st. A storm presenting the characteristics of a tornado of limited energy occurred near Hiram, Ohio, on the 21st. Destructive storms occurred in Kentucky, Tennessee, Ohio, West Virginia, and western Pennsylvania on the 26th; in Michigan on the 28th;

and in Idaho on the 29th. Water-spouts were observed at Key West, Fla., on the 20th, and at Galveston, Tex., on the 30th.

The Arkansas River fell to zero on the gauge at Fort Smith, Ark., on the 12th; this was the lowest stage of water at that place since 1856. The Gila River, Arizona, was high about one-third of the month, and considerable damage was caused by flood. The drought which prevailed in Kansas, Nebraska,

South Dakota, Iowa, northern Texas, Indian Territory, Minnesota, and parts of the upper lake region, and the Ohio valley and Tennessee was generally broken by rain in the early part of the month. Noteworthy auroral displays were reported at Saint Andrews, N. B., on the 14th; at Green Mountain, Me., on the 14-15th, and 18th; at Sault de Ste. Marie, Mich., on the 17-18th, and 19th; and at Saint Vincent, Minn., 19-20th.

ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for August, 1890, as determined from observations taken daily at 8 a. m. and 8 p. m. (75th meridian time), is shown on chart II by isobars. The departure of the mean pressure for August, 1890, obtained from observations taken twice daily at the hours named, from that determined from hourly observations, varied at the stations named below, as follows:

Station.	Departure.	Station.	Departure.
Eastport, Me.	+ .008	Duluth, Minn.	— .005
Boston, Mass.	+ .010	Saint Louis, Mo.	— .006
New York City.	+ .001	New Orleans, La.	— .001
Philadelphia, Pa.	+ .008	Galveston, Tex.	— .010
Washington City.	+ .010	Santa Fé, N. Mex.	— .012
Savannah, Ga.	+ .007	Denver, Colo.	— .007
Buffalo, N. Y.	+ .007	Fort Assiniboine, Mont.	— .006
Detroit, Mich.	+ .004	Salt Lake City, Utah.	— .013
Cincinnati, Ohio.	+ .006	Portland, Oregon.	— .012
Chicago, Ill.	— .000	San Francisco, Cal.	— .016
Saint Paul, Minn.	— .003	San Diego, Cal.	— .016

The mean pressure was highest from eastern Tenn. to the Atlantic coast between the 30th and 35th parallels, where it was above 30.10, and the mean pressure was lowest over the southwest part of the plateau region, where it was below 29.85. From the middle and lower Mississippi valleys eastward to the Atlantic coast and on the immediate north Pacific coast the mean pressure was above 30.05, and in the British Possessions north of N. Dak. and Mont. the mean readings were below 29.90.

A comparison of the pressure chart for August with that of the preceding month shows that there was an increase in mean pressure, save on the Pacific coast north of the 35th parallel, on the Atlantic coast from southern N. J. to N. S., and over southern Fla. The greatest increase in mean pressure occurred from the upper lake region and the west part of the Ohio Valley westward over the southern and the east parts of the middle and northern plateau regions, where it was more than .05. In sections where there was a decrease in mean pressure the changes were less than .05.

The mean pressure was generally above the normal over the entire country. In the Dakotas, Manitoba, northern Ontario, and at stations in the middle Atlantic states and New England the mean pressure was normal or slightly below. The greatest departures above the normal pressure occurred in the south Atlantic and east Gulf states and thence northward to the southern part of the upper lake region, and in the middle plateau region, where they equalled or exceeded .05.

The monthly barometric ranges at the several Signal Service stations are shown in the table of Signal Service data on the last two pages of the REVIEW.

HIGH PRESSURE AREAS.

During the past month the paths of 9 Highs could be traced within the United States for a period of at least 48 hours. 6 of these originated over the Pacific and the other 3 beyond the limits of the map in N. W. T. The paths of these Highs were markedly in high latitudes, only 1, VIII, reaching as far south as 35°, where it lost its identity. The permanent High of the Sargossa Sea seems to have moved slightly west and north of its position in July, and, in consequence, the motion of these Highs tended either to the north or else they gradually spread out and lost their identity as they approached the Atlantic coast. It should be noted that in determining

the velocity of Highs it is often difficult to fix upon the exact starting point, as there frequently seems to be a condition favorable to this formation for several days in one locality before there is any definite movement. There also seems to be a transference of the High from one point to another without a definite motion, this is especially noticeable in the plateau regions. There will be found, at the end of this description, a table which gives the principal points regarding these Highs, and the following details are added:

I.—On the first of the month a High of very slight magnitude was central over Lake Michigan. It was noted on the Pacific coast on July 30th, and seems to have moved or progressed from the Pacific coast at a great velocity. On the succeeding days it was partly merged in the Atlantic High, and all trace was lost on the 2d. One inch of rain fell in the "Col" between this High and another to the south in the 12 hours ending 8 p. m. of the 1st.

II.—Was noted off the Pacific coast p. m. of the 2d. Its path curved south on the 3d, through southern Indiana on the 6th; recurving it passed off the Nova Scotia coast on the 8th. The lowest temperature was 44° at Fort Assiniboine, Mont., a. m. of the 3d, and the highest pressure 30.28 at Rockliffe, Ont., a. m. of 7th.

III.—For several days previous to the 6th the pressure had been rising off the north Pacific coast. The isobars and wind directions a. m. of 7th show this High as an offshoot of the Pacific high just to the northwest of Oregon. This was transferred to Montana during the next 12 hours and remained stationary there till 8th a. m. From this point the course was nearly due east, passing off the Nova Scotia coast a. m. 13th. There was a marked oscillation in the pressure from a. m. to p. m. during its passage, as was noted in many other cases also. The following table gives the area covered by the 30.20 isobar a. m. and p. m. during its progress:

Area of isobar of 30.20.

Date.	Square miles.		Date.	Square miles.	
	A. M.	P. M.		A. M.	P. M.
8	20,000	0	11	300,000	10,000
9	60,000	0	12	400,000	0
10	200,000	0	13	100,000	0

IV.—Originated exactly like III off the Pacific coast, and its path followed the same direction, except that as it approached the Atlantic it had a motion to the southeast, as the permanent High there had apparently moved eastward. In consequence this moved off the coast of Connecticut on 16th. The severe frosts in New York occurred in connection with this High 16th a. m.

V.—Was first noted at Edmonton, N. W. T., 15th. Its motion was rather slow at first, reaching Saint Vincent, Minn., in two days and giving the first frost of the season at that point. It had a motion nearly due east and passed off the Nova Scotia coast 19th a. m.

VI.—Originated off the coast of Oregon a. m. of 17th and it was transferred from there to Montana p. m. of the same day. Its motion had a slight bend to the southward, but its general motion was east. It passed off the Nova Scotia coast on 21st. Rains were quite frequent near the centre.

VII.—Had its origin in Manitoba on 21st. The killing frost at Saint Vincent, Minn., morning of 22d, occurred in its centre; and frosts were reported from lower Michigan the next morning also. The highest pressure of the month (30.40) occurred at Green Bay, Wis., a. m. of 23d.

VIII.—On the evening of the 23d Pacific High had moved to the Oregon coast and an offshoot from this was transferred to Wyoming during the next 24 hours. Its intensity was very slight and it was entirely obliterated in Missouri a. m. of 28th. Quite heavy rain occurred at Denver, Colo., in its centre a. m. of the 26th.

IX.—Was first noted to the north of Edmonton, N. W. T., a. m. of 26th. Its motion was first a little south of east, then east, and it had reached Lake Erie on the last day of the month.

LOW PRESSURE AREAS OR STORMS.

There were 11 Lows having a motion for at least 2 days during the past month. Seven of these were first noted in N. W. T. The general path was to the north, exactly as in July. The principal characteristics are given in a table at the end of this description. The following notes are added:

I.—Had an origin in Wyoming on the last day of July; its motion was a little north of east and was last noted on the 2d to the north of Lake Superior, though its effects were felt along the upper lakes a few days later. The heaviest rain in 12 hours, 2.40, was at Dubuque, Iowa, a. m. of 3d.

II.—Was first noted in N. W. T. on 5th; its motion was nearly due east, and it passed off Anticosti 11th. The heaviest rain in 12 hours was at Narragansett Pier, R. I., 2.05, 9th.

III.—Like the last was noted in N. W. T. on the 9th. Its progress was rather erratic but generally east, and it passed down to the mouth of the Saint Lawrence on 15th. The heaviest rain in 12 hours, 1.04, was at Washington City, 15th.

IV.—Was like the last in its origin, on the 13th, and in its path; it disappeared off Nova Scotia 18th; a remarkable rain of 3.20 in 70 minutes is reported at Colorado Springs p. m. of 14th. This point was more than 900 miles from the storm-centre, but the rain seems to have been connected with it.

V.—This storm originated in S. Dak. on the 15th; its motion was due south, and all trace of it is lost on 17th. It may be regarded as an offshoot from IV. Rain to the amount of 2.00 in 12 hours was reported at Fort Smith, Ark., on 17th.

VI.—In most respects this was the most remarkable storm of the month. Starting in the Panhandle of Texas a. m. of the 18th, it had a motion of 45 miles per hour, a little east of north. This was the highest velocity of any storm during the month. As shown by the isobars it had a very slight intensity, the pressure scarcely falling below 30.00 during the whole course. It also had the lowest velocity of the wind accompanying it, with one exception. A rainfall of 1.17 in 12 hours was reported from Parkersburgh, W. Va., 20th. But the most memorable event in its course was the Wilkes Barre, Pa., tornado on the 19th. In this 16 persons lost their lives, and nearly \$600,000 of property was destroyed. (See "Local storms.")

VII.—Started in Manitoba on the 19th and moved nearly due east to the mouth of the Saint Lawrence on the 25th. The last three days of its motion the path was very erratic. The most widespread general rain of the month accompanied this storm, 1.60 in 12 hours being reported at Toledo, Ohio, on the 21st.

VIII.—This storm started in the N. W. T. on the 21st. Its motion was nearly due east and it passed off the Nova Scotia coast on the 28th. The highest wind velocity of the month, but one, 58 miles per hour, was reported with this storm on the 24th at Valentine, Nebr. A rainfall of 2.54 in 12 hours was reported from Cincinnati, Ohio, on the 26th.

IX.—Similar to VI, this storm originated in the Panhandle of Texas on the 25th. Its motion was first se. till the 27th, on which date the cyclone in the Gulf, notice of which is given later in "North Atlantic storms," united with it. After the 27th its course was nearly due east, its last appearance being on the Carolina coast on the 29th. This storm undoubtedly

united with the West India cyclone which approached the Atlantic coast on the 30th from the se.

The heavy rainfall in connection with this storm was quite interesting. For 12 hours ending p. m. of the 25th 1.06 fell at Concordia, Kans., which was on the north border about 400 miles from centre. In the next 12 hours 1.80 fell at Fort Sill, Ind. T., and 1.08 at Fort Elliott, Tex., in the centre, nearly. In the next period of 12 hours 0.52 fell at Port Eads, La., about 300 miles to se. of centre. In the next period 1.17 fell at New Orleans, about 300 miles in front, 1.48 at Memphis, Tenn., about 450 miles to the ne., and 1.00 fell at Nashville, 600 miles ne., while there was not a drop at Meridian, Miss., 250 miles ene.; 0.04 at Mobile, Ala., nearly e. of centre, and 0.02 at Port Eads, La., 200 miles ese. of centre. In the next period 1.32 fell at Vicksburg, Miss., 100 miles in front, and 1.00 at Meridian, Miss., about 200 miles in front or e. of centre. None fell at Pensacola, Fla., 300 miles ese. of centre. In the next period 1.02 fell at Mobile, Ala., 200 miles s., and 1.08 at Montgomery, Ala., about 200 miles e. In the next period 1.34 fell at Chattanooga, Tenn., 1.50 miles n., and 1.01 at Pensacola, Fla., the same distance s. In the next 12 hours ending a. m. of the 29th 1.42 fell at Charlotte, N. C., about 100 miles n., while none fell at Charleston, very near the centre. As the storm passed off the coast 3.16 fell from 8 a. m. to 3.20 p. m. on the 29th at Hatteras, N. C., about 200 miles to n. of centre. During 29th 3.10 fell at Lumberton, N. C., 3.00 at Athens, Ga., 2.40 at Cheraw, S. C., and 2.30 at Columbia, S. C., which was the heaviest rain of the month at so many stations.

X.—Originated in Manitoba on the 26th. Its course was slightly se. at first, then gently bending to ne. it passed off the Nova Scotia coast on 31st. The rainfall during its whole course was insignificant, the heaviest in 12 hours, 0.63, occurring at Manchester, N. H., on 30th.

The following table gives the approximate velocity of Highs and Lows during July and August. In this table the middle day of the storm instead of the first day is taken as the proper point in chronological order:

		<i>July.</i>																	
Number...	I	L	I	L	I	H	I	L	I	H	I	L	V	L	I	H	V	L	I
Velocity...	11	13	22	29	24	20	14	29	42	19	17	16	18	35					

		<i>August.</i>																	
Number.....	I	H	I	L	I	H	I	L	I	H	I	L	V	L	I	H	V	L	I
Velocity.....	37	23	29	20	19	21	22	23	26	30	45	41							

These velocities have a maximum on July 16th, August 1st, and August 19th. A study has been made of storm velocities for the past 20 months, but it has been found impossible to make a satisfactory determination of the velocity. If there is a regular progression in our storms and Highs it should be possible to determine it day by day.

The velocities of either High or Low for any day in any part of the country were combined together to form a mean velocity of progression in the upper current, or in whatever action may be supposed to cause these motions. The following table exhibits these mean velocities for August:

Date	July 30 a. m.-30 p. m.						Aug. 1						
Velocity	8	9	10	11	12	13	14	15	16	17	18	19	
Date	30	31	12	15	17	18	15	11	7	26	28	18	
Velocity	43	35	40	40	19	27	21	14	28	20	22	19	

In this table the date has two figures under it; the first is the motion from 8 p. m. of previous day to 8 a. m. of this date, and the second the motion from 8 a. m. to 8 p. m. of this date. It will be seen by these figures that there is a maximum in this progression on July 30th and on August 19th, with secondary maxima on August 4th and 8th, and a very quiet period from August 23d-31st. The uniformity of velocity in this table is quite remarkable considering the fact that it is taken from all parts of the country and in both Highs and Lows. There is only a single serious break and that is on the 18th.

As noted in the July REVIEW there seems to be an increase of velocity as the Low passes along the higher latitudes and

also there is often a long delay in the beginning of a storm or High, so that great care is needed in measuring the velocity.

The following table gives the approximate velocity of storms during the past 18 years. There has been no opportunity to make a projection of the tracks or measurement of these velocities except such as a close scrutiny of records would give:

Year.	Number.	Velocity per hour.	Year.	Number.	Velocity per hour.
		Miles.			Miles.
1873	6	28.0	1883	6	28.0
1874	7	24.0	1884	5	32.0
1875	4	17.0	1885	6	32.0
1876	6	31.0	1886	6	32.0
1877	5	23.0	1887	5	27.0
1878	4	25.0	1888	6	33.0
1879	6	23.0	1889	6	24.0
1880	4	32.0	1890	10	24.0
1881	4	28.0			
1882	5	23.0	Mean.....	5.6	25.3

Little significance can be placed upon the marked diminution in 1875 nor on the increase in '80, '84, and '86. It is probable that the mean velocity of storms during July in this country is about 24 miles per hour, and in August perhaps a very little greater. During the earlier years it was very difficult to trace storms to the west of the Mississippi and, as it is probable that the velocity is a very little less in that region than to the east, we may consider these values as slightly in excess, if anything.

As already noted under High III, there is a uniform oscillation in air pressure from morning till night. In order to find whether this extended to the Low as well, the following table was prepared showing the area in square miles within the isobar 30.20 and also within the isobar 29.60. A serious difficulty exists in such measurements owing to the lack of ob-

servations to the north. The observations at high stations in British N. W. T. cannot be used since the observed temperature is used for reducing barometer readings to sea level, while in the United States this difficulty is overcome by using the mean 24-hour temperature for making the reduction, thus eliminating the diurnal range of temperature from 8 a. m. to 8 p. m.:

Table showing mean area (in square miles) of isobars 30.20 and 29.60.

Date.	30.20.		29.60.		Date.	30.20.		29.60.	
	A. M.	P. M.	A. M.	P. M.		A. M.	P. M.	A. M.	P. M.
1	0	0	30,000	240,000	17	1,100,000	500,000	0	0
2	30,000	0	20,000	20,000	18	900,000	250,000	0	0
3	40,000	0	0	0	19	700,000	150,000	0	0
4	0	0	0	0	20	5,000	0	0	0
5	300,000	0	0	0	21	100,000	50,000	0	20,000
6	120,000	2,000	0	20,000	22	800,000	400,000	1,000	20,000
7	20,000	0	0	20,000	23	650,000	400,000	0	40,000
8	60,000	0	0	0	24	600,000	10,000	10,000	40,000
9	200,000	0	0	0	25	10,000	0	5,000	0
10	300,000	10,000	0	40,000	26	0	0	0	0
11	400,000	0	0	0	27	0	0	50,000	300,000
12	150,000	0	0	0	28	0	0	100,000	100,000
13	150,000	0	0	0	29	0	0	0	80,000
14	30,000	0	0	80,000	30	0	0	0	150,000
15	150,000	50,000	0	0	31	200,000	100,000	100,000	0
16	800,000	200,000	0	0					

This table shows that there is a marked oscillation in the centre of a High, the pressure being very much higher in the a. m. than p. m. In the centre of Low there is also an oscillation in the opposite direction, but the isobar of 29.60 is a little too low to show this well in August. With a few exceptions the pressure is lower in a Low in the p. m. than in the morning. This would seem to have an important bearing upon the question of the diurnal range of the barometer, and, when properly studied, may possibly assist in developing the theory of storms.

Tabulated statement showing principal characteristics of areas of high and low pressure.

Barometer.	First observed.			Last observed.		Duration.	Velocity per hour.	Maximum pressure change and maximum abnormal temperature change in twelve hours and maximum wind velocity.											
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.			Station.	Rise.	Date.	Station.	Fall.	Date.	Station.	Direction.	Miles per hour.	Date.		
High areas.		°	°	°	°	Days.	Miles.		Inch.			°							
I.	1	44	88	43	68	3-5	57	Father Point, Quebec....	.26	1	Philadelphia, Pa.....	.14	1	Sandusky, Ohio	ne.	16	1		
II.	2	47	125	47	60	5-5	29	Bismarck, N. Dak.....	.32	2	Fort Sully, S. Dak.....	.19	2	Helena, Mont.....	nw.	30	2		
III.	6	47	126	47	62	7-0	19	Anticosti Island, G. St. L.	.36	12	Bismarck, N. Dak.....	.21	7	Chicago, Ill.....	ne.	40	11		
IV.	11	46	124	41	72	5-5	22	Saugeen, Ont.....	.30	15	Swift Current, N. W. T...	.21	11	Block Island, R. I.....	ne.	14	16		
V.	13	53	116	46	59	4-0	30	Huron, S. Dak.....	.44	16	Fort Assiniboine, Mont.	.27	15	.....do.....	e.	24	19		
VI.	17	48	126	45	61	3-5	41	Chatham, N. B.....	.30	20	Dodge City, Kans.....	.21	19	.....do.....	e.	18	21		
VII.	21	52	105	43	79	3-5	18	Father Point, Quebec....	.34	22	Bismarck, N. Dak.....	.25	21	Grand Haven, Mich.....	nw.	30	22		
VIII.	23	48	125	38	93	4-5	19	Eastport, Me.....	.30	28	Concordia, Kans.....	.15	25	Fort Assiniboine, Mont.	sw.	14	26		
IX.	26	54	115	42	82	5-0	17	Rockliffe, Ont.....	.26	30	Huron, S. Dak.....	.16	29	Chicago, Ill.....	e.	12	30		
Mean.....						4-7	26		.32			.20				21			
Low areas.									Fall.			Rise.							
I.	1	46	104	49	90	2-0	23	Huron, S. Dak.....	.34	1	Valentine, Nebr.....	.18	1	Marquette, Mich.....	sw.	48	2		
II.	3	51	110	50	63	5-5	20	Halifax, N. S.....	.24	10	Rapid City, S. Dak.....	.24	6	Fort Sully, S. Dak.....	nw.	56	7		
III.	9	52	115	51	63	5-5	21	Fort Sully, S. Dak.....	.24	11	Fort Sully, S. Dak.....	.15	9	Rapid City, S. Dak.....	sw.	56	11		
IV.	13	51	116	47	62	4-5	23	Fort Buford, N. Dak.....	.36	14	Northfield, Vt.....	.19	17	Fort Sully, S. Dak.....	nw.	44	15		
V.	15	45	98	34	94	2-0	26	Fort Smith, Ark.....	.14	16	Cairo, Ill.....	.10	16	Kansas City, Mo.....	nw.	26	16		
VI.	18	36	102	48	63	2-0	45	Chatham, N. B.....	.34	20	Sydney, C. B. I.....	.10	20	Eastport, Me.....	se.	28	20		
VII.	19	52	105	51	66	5-5	25	Montreal, Quebec.....	.48	21	Fort Buford, N. Dak.....	.21	19	Montreal, Quebec.....	s.	44	22		
VIII.	21	53	116	47	60	7-0	18	Eastport, Me.....	.62	27	Fort Custer, Mont.....	.20	21	Valentine, Nebr.....	n.	68	24		
IX.	25	36	102	35	73	5-0	19	Wilmington, N. C.....	.18	29	Mobile, Ala.....	.10	27	Port Eads, La.....	sw.	48	27		
X.	26	51	104	46	62	4-5	18	Milwaukee, Wis.....	.24	28	Cheyenne, Wyo.....	.26	26	Buffalo, N. Y.....	sw.	32	29		
Mean.....						4-4	24		.32			.17				45			

NORTH ATLANTIC STORMS FOR AUGUST, 1890 (pressure in inches and millimetres; wind-force by Beaufort scale).

The paths of the storms that appeared over the north Atlantic Ocean during August, 1890, are shown on chart I. These paths have been determined from international observations by captains of ocean steamships and sailing vessels received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

Eight storms have been traced for August, 1890, the average number for the corresponding month of the last 7 years being

9. Of the storms traced for the current month 4 were continuations of storms which first appeared over the North American continent; one was central on the 1st north of Newfoundland; one moved eastward between the Grand Banks and Greenland, thence southeastward to about the 20th meridian, and thence northwestward to the British Isles; one apparently developed off the middle Atlantic coast; and one is given an approximate north of west path north of the West Indies to a

point about midway between the Bahamas and Bermuda, where it recurved northward and moved northeastward about midway between Bermuda and Nova Scotia. No storms traversed the ocean from coast to coast. With the exception of the West India cyclone referred to, no violent storms were reported for the month, and the weather was generally fine along the steamship tracks.

In August of preceding years well-defined storms of destructive violence, averaging about 2 per month, have moved westward over or near the West Indies, and thence recurved over the Gulf of Mexico or off the Atlantic coast states. Storms of great strength have also appeared over the west Gulf. Among notable West India and Gulf storms charted and described in the REVIEW for August of preceding years were: 1879, 17th to 19th, storm moved from the Bahamas along the Atlantic coast, attended by gales of hurricane force and unusually high tides. 1880, 12-13th, storm in west Gulf devastated the Texas coast at the mouth of the Rio Grande; 18th, storm at the Island of Jamaica caused loss of life and immense damage to shipping and property; 26th to 31st, storm moved north of the Bahamas and crossed north Florida 29-30th, strewing the Florida coast with wrecks and doing great damage to property and crops. 1881, 27th, storm moved north of west to the coast near Savannah, Ga., causing extensive destruction of property and loss of life. 1885, 23d to 25th, storm moved along east Florida and south Atlantic coasts, causing great destruction on the south Atlantic coast, where the damage was estimated at \$1,500,000. 1886, two severe storms moved north of west over the Caribbean Sea, one recurving northward over Cuba and the Bahamas, and the other passing into the Gulf; 19-20th, a very destructive storm in the west Gulf; at Indianola, Tex., not a building was left standing, and the barometer fell to about 28.00 (711). 1887, two energetic and destructive storms moved from the vicinity of the Windward Islands, north of the West Indies, to the Bahamas, where they recurved north and northeast. 1888, 16th to 19th, storm moved from the Bahamas to the west Gulf coast, with violent squalls and heavy rain.

August, 1890, opened with low pressure north of Newfoundland and fresh gales over the Grand Banks; high pressure prevailed over mid-ocean south of the 50th parallel; while over the eastern part of the ocean moderate to fresh gales attended a depression central north of the British Isles. On the 4th a storm was central far to the north of Newfoundland, whence it moved southeastward to about N. 46°, W. 17° by the 9th, with pressure 29.40 (747) to 29.60 (752) and fresh gales, and thence passed northeastward to southern Ireland by the 10th. From this date until the 17th the pressure continued low over the British Isles, and on the 15th a barometer reading of 29.01 (737) was reported at Leith, Scotland. On the 6th a storm of moderate energy was central in the lower Saint Lawrence valley, whence it moved to north of the Grand Banks by the 7th, after which it apparently advanced south of east and united with the depression central over mid-ocean. On the 10th a storm was central in the Saint Lawrence Valley, whence it moved to north of Newfoundland by the 11th, without evidence of marked energy. On the 11th a dispatch from Havana, Cuba, stated that there were some indications of a far cyclone east by south from Cuba. On the 12th a dispatch from Havana, Cuba, stated that a cyclone moving nw. to south Atlantic coast was far to the ne. of that place. On this date a storm of moderate energy was central in about N. 39°, W. 67°, to which position it had apparently advanced from the sw. On the 13th a slight depression was central south of Nova Scotia, after which it disappeared. On the 15th and 16th a storm of moderate strength moved eastward north of the Gulf of Saint Lawrence over Labrador, after which it disappeared north of the region of observation. On the 17th a storm moved eastward to the Gulf of Saint Lawrence and on the 18th and 19th probably moved northeast beyond the region of observation. The evening of the 23d a dispatch from Havana, Cuba, stated that there was a moderate cyclonic disturbance, with heavy rain, southeast of that place. From the 23d to 27th low pres-

ure prevailed over and near the British Isles, and on the 26th the barometer reading at Leith, Scotland, was 29.19 (741), and fresh to strong gales prevailed over the east part of the ocean.

On the 24th a dispatch from Havana, Cuba, stated that a disturbance was sw. from that place, increasing in energy. A dispatch dated Havana, Cuba, 25th, 7.35 p. m., stated that the disturbance was west, probably moving wnw., and on the 26th a dispatch from Havana stated that there was a disturbance far w. by n., resembling a moderately large diameter cyclone, which would probably recurve near Texas. On the morning of the 27th the storm referred to in dispatches from Havana was well-defined over the northwest Gulf, and during that date it advanced over the lower Mississippi valley. On the 28th a storm was central over the Gulf of Saint Lawrence, with pressure below 29.30 (744) and fresh gales, whence it moved ene. over Newfoundland by the 29th, after which it disappeared north of the region of observation.

The most important storm of the month was the West India cyclone of the 27th-31st, the path of which is approximately plotted on chart I. This storm was first reported to the eastward of the Windward Islands on the 26th. On this date the s. s. "Haytian," at noon, in N. 24° 52', W. 54° 45', had moderate e. breeze, with cloudy, squally, dirty weather, and wind increasing in the afternoon. On the 27th, at noon, this vessel was in N. 22° 18', W. 58° 35', and reported squally e. winds, dull weather, falling barometer, heavy rain and high sea. In the afternoon and evening hard gale and high sea, terrific squalls, wind and rain, blinding lightning from w. and southward. Stopped engines and hove ship to on starboard tack, heading nne. at 11 p. m. At midnight heavy gale with terrific squalls and high confused seas. On the 28th at noon, in N. 22° 55', W. 59° 34', wind e. strong, and heavy easterly swell. Mr. Joseph Ridgway, jr., the observer at Saint Thomas, W. I., reports that on the 26th and 27th there were indications of a cyclone in the neighborhood of Saint Thomas. The barometer (aneroid) fell to 29.89 (759) to 29.90 (759) (113 feet), the usual reading being 30.00 (762) to 30.02 (762). The wind shifted from ne. to nw. and w., with strong puffs from the ne. The tide was higher than usual and there was a southerly swell. The barometer did not rise to its usual position until midnight of the 27th. Mr. Ridgway stated further that the s. s. "Alliance," from Newport News, arrived 11 p. m., 28th, and reported having encountered heavy seas from e. and se.; lowest barometer 29.90 (759), and that the s. s. "Portuense" was sunk in a hurricane on the 28th about 250 miles ne. from Anegada Island, and captain and 9 of crew lost; the balance of the crew reached Tortola Island in the ship's life boat. The "Portuense" foundered in about N. 21°, W. 63°, shortly after 6.30 a. m., 28th; between 2 and 3 a. m. a fearful ne. hurricane raged and the barometer was reported 28.50 (724); shortly after ship foundered the wind went to sse. The bkn. "Onalaska," at 8 a. m., 28th, in N. 24°, W. 62° 20', had hard gale from ese., with terrific sea running from se. and s.; the barometer which had been standing at 30.30 (770) fell to 29.70 (754). Hove to with head to s., and so remained 10 hours, the hurricane evidently passed to the sw. On the 30th the brig "Abbie Clifford" was wrecked, with loss of life, in about N. 30°, W. 67°. At 2 a. m., 31st, the s. s. "Orinoco" was struck by a hurricane about 100 miles nw. from Bermuda. The wind came from about sse., and terrific seas swept over the vessel, carrying all movable objects overboard, smashing the steering gear and a life boat, and flooding the saloon. The barometer stood at 29.20 (742) until 4 a. m., when it began to rise, and at 10 a. m. the wind was sw. Terrible storms of hurricane force were encountered during the 31st along the trans-Atlantic steamship routes south of Nova Scotia. Reports at hand will not admit of more definitely describing this storm or of more accurately locating its path.

FOG IN AUGUST.

The limits of fog-belts west of the 40th meridian, as determined from reports of shipmasters, are shown on chart I by

dotted shading. In the vicinity of the Banks of Newfoundland fog was reported on 21 dates; between the 55th and 65th meridians on 11 dates; and west of the 65th meridian on 9 dates. Compared with the corresponding month of the last two years the dates of occurrence of fog near the Grand Banks numbered one less than the average; between the 55th and 65th meridians 2 more than the average; and west of the 65th meridian the same as the average. On the dates for which fog was reported near the Grand Banks general storms were approaching from the west, except on the 8th when variable winds and unsettled weather prevailed, and on the 26th with southerly winds and falling barometer. On the dates fog was reported between the 55th and 65th meridians it occurred with the approach or passage to the northward of general storms, save on the 2d when se. winds and unsettled weather prevailed. On the dates fog was reported west of the 65th meridian it occurred with the approach or passage to the northward of general storms, save on the 2d, 3d, and 13th when variable or southerly winds and unsettled weather prevailed in that region. On the 2d to 6th, 10th, 11th, 14th, and 26th dense fog was reported at points along the New England and New York coasts by observers of the Signal Service, its occurrence in each instance attending the presence in the Saint Lawrence Valley or the Lake region of general storms whose influence extended off the coast.

OCEAN ICE IN AUGUST.

The table below shows that for August, 1890, ice was reported nearly 3° south and about 5½° east of the average southern and eastern limits of ice for the month, as determined from reports of the last 8 years. The southernmost ice reported for the current month, 3 small icebergs on the 19th in the position

given, was less than 1° farther north than the southernmost ice reported for August, a large iceberg in N. 42° 21', W. 49° 51', in 1887, and the easternmost ice reported for the current month, a flat iceberg on the 5th in the position given, was nearly 1° east of the easternmost ice reported for August, noted in 1887 and 1889. Comparing the current with the preceding month there was a decrease in the aggregate quantity of ice reported over and near the Banks of Newfoundland and along the east coast of Newfoundland. Numerous icebergs were reported in the Straits of Belle Isle and thence eastward to the 49th meridian throughout the month. Compared with the corresponding month of the last 8 years the ice reported for August, 1890, about equalled the average in quantity. The limits of the region within which Arctic ice was reported for August, 1890, are shown on chart I by ruled shading.

The following table shows the southern and eastern limits of the region within which icebergs or field ice were reported for August, during the last nine years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
August, 1882	46 50	46 00	August, 1882	46 50	46 00
August, 1883	43 26	51 41	August, 1883	48 00	44 00
August, 1884	43 24	48 44	August, 1884	47 50	43 50
August, 1885	43 48	52 04	August, 1885	48 03	42 45
August, 1886	48 35	48 46	August, 1886	50 00	48 00
August, 1887	42 21	49 51	August, 1887	48 06	40 00
August, 1888	43 34	48 36	August, 1888	51 53	55 00
August, 1889	42 30	50 21	August, 1889	53 00	45 00
August, 1890	42 30	50 21	August, 1890	50 13	39 10
Average	45 06	50 14	Average	49 19	44 42

* Straits of Belle Isle.

† Isolated field ice in N. 58°, W. 40°.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

Many of the voluntary stations do not have standard thermometers or shelters.

The distribution of mean temperature over the United States and Canada for August, 1890, is exhibited on chart II by dotted isotherms. In the table of Signal Service data the monthly mean temperature and the departure from the normal are given for regular stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Signal Service represents the mean of the maximum and minimum temperatures.

The mean temperature was highest from south Nev. southward over extreme southeast Cal. and west Ariz., where it was above 85, and at stations in that region the mean value was above 90. The mean temperature was also above 85 at stations in the lower Rio Grande valley. North of a line traced from the Atlantic coast in latitude about N. 30° westward along the east Gulf coast, thence northwestward to south Kans., and thence southwestward to the middle Rio Grande valley, and in the Gila, lower Colorado, San Joaquin, and Sacramento valleys the mean temperature was above 80. The mean temperature was lowest at elevated stations in west-central Colo., and in the lower Saint Lawrence valley and north Ontario, where it was below 55, and north of a line traced from north New Brunswick westward to northern Wis., thence northwestward to Manitoba, and thence westward to the Pacific coast the mean temperature was below 60. The mean temperature was also below 60 along the Pacific coast north of San Francisco, Cal.

The mean temperature was below the normal, except in eastern Me. and the Canadian Maritime Provinces, at stations on the south New England and New York coasts, over the southeast slope of the Rocky Mountains and thence southward to the

lower Rio Grande valley, over the northern plateau region, and along the immediate Pacific coast between the 33d and 45th parallels. The greatest departures below the normal temperature were noted in the upper Mississippi valley and thence northward to the British Possessions, where they exceeded 3, and the greatest departures above the normal temperature were noted at Sydney, C. B. I., and San Francisco, Cal., where they exceeded 3 and 2, respectively.

At stations in the west part of the upper lake region and the northern part of the upper Mississippi valley, and at Lenoir, N. C., the mean temperature was the lowest, and at stations on the N. C. and middle Cal. coasts, and in the lower Rio Grande valley, the mean temperature was the highest reported for August.

DEVIATIONS FROM NORMAL TEMPERATURE.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for August for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for August, 1890; (4) the departure of the current month from the normal; (5) and the extreme monthly mean for August, during the period of observation and the years of occurrence:

State and station.	County.	(1) Normal for the month of Aug.	(2) Length of record.	(3) Mean for Aug., 1890.	(4) Departure from normal.	(5) Extreme monthly mean for Aug.			
						Highest.	Year.	Lowest.	Year.
Arkansas.			Years						
Lead Hill	Boone	77.8	8	78.3	+ 0.5	81.0	1886	75.5	1882
California.									
Sacramento	Sacramento	71.5	37	66.8	- 4.7	76.0	1866	66.2	1887

Deviations from normal temperature—Continued.

State and station.	County.	(1) Normal for the month of Aug.	(2) Length of record.	(3) Mean for Aug. 1890.	(4) Departure from normal.	(5) Extreme monthly mean for Aug.			
						Highest.	Year.	Lowest.	Year.
<i>Connecticut.</i>									
Middletown.....	Middlesex....	74.2	18	67.8	- 6.4	73.0	1870	65.9	1861
<i>Florida.</i>									
Merritt's Island..	Brevard.....	81.1	8	81.6	+ 0.5	83.8	1883	78.8	1889
<i>Georgia.</i>									
Forayth.....	Monroe.....	78.8	16	78.5	- 0.3	82.4	1878	73.2	1885
<i>Illinois.</i>									
Peoria.....	Peoria.....	75.5	34	73.3	- 2.2	80.5	1881	70.1	1866
Riley.....	McHenry.....	68.8	34	65.2	- 3.6	73.4	1867	64.1	1885
<i>Indiana.</i>									
Vevay.....	Switzerland..	75.0	24	71.6	- 3.4	80.7	1881	69.9	1875
<i>Iowa.</i>									
Cresco.....	Howard.....	69.2	17	63.9	- 5.3	72.6	1881	63.1	1885
Monticello.....	Jones.....	70.1	35	66.7	- 3.4	77.1	1861	64.3	1863
Logan.....	Harrison.....	73.6	16	70.4	- 3.2	79.6	1881	68.2	1875
<i>Kansas.</i>									
Lawrence.....	Douglas.....	75.4	22	73.7	- 1.7	83.4	1874	71.1	1884
Wellington.....	Sumner.....	76.6	11	79.2	+ 2.6	82.6	1881	70.1	1884
<i>Louisiana.</i>									
Grand Coteau....	Saint Landry..	81.6	7	79.5	- 2.1	83.6	1883	78.9	1889
<i>Maine.</i>									
Orono.....	Penobscot....	65.3	20	64.8	- 0.5	67.5	1881	63.1	1874
<i>Maryland.</i>									
Cumberland.....	Allegany.....	69.8	31	69.8	0.0	75.7	1871, '72	63.6	1866
<i>Massachusetts.</i>									
Amherst.....	Hampshire....	67.3	54	67.1	- 0.2	71.6	1872	63.5	1866
Newburyport....	Essex.....	66.9	12	66.8	- 0.1	69.5	1882	65.3	1889
Somerset.....	Bristol.....	71.6	18	71.8	+ 0.2	75.0	1877	68.6	1874
<i>Michigan.</i>									
Kalamazoo.....	Kalamazoo....	69.4	13	67.3	- 2.2	73.0	1881	63.8	1885
Thornville.....	Lapeer.....	69.6	13	65.6	- 4.0	74.5	1881	64.7	1885
<i>Minnesota.</i>									
Minneapolis.....	Hennepin....	68.1	25	64.1	- 4.0	72.3	1881	63.8	1885
<i>Montana.</i>									
Fort Shaw.....	Lewis & Clarke	64.8	20	64.7	- 0.1	69.8	1882	53.7	1873
<i>New Hampshire.</i>									
Hanover.....	Grafton.....	65.8	44	64.6	- 1.2	70.4	1881	59.2	1885
<i>New Jersey.</i>									
Moorestown.....	Burlington....	72.0	27	70.9	- 1.1	76.1	1864	68.1	1883
South Orange....	Essex.....	70.8	19	69.5	- 1.3	74.5	1877	68.1	1883, '89
<i>New York.</i>									
Cooperstown....	Otsego.....	65.6	35	63.6	- 2.0	71.5	1877	61.0	1861
Palermo.....	Oswego.....	66.9	30	65.2	- 1.7	71.6	1877	61.6	1885
<i>North Carolina.</i>									
Lenoir.....	Caldwell.....	73.4	17	70.0	- 3.4	77.0	1877	70.0	1890
<i>Ohio.</i>									
N'th Lewisburgh.	Champaign....	70.7	58	72.3	+ 1.6	75.0	1880	64.0	1876
Wauseon.....	Fulton.....	69.4	20	67.7	- 1.7	72.8	1872	63.0	1870
<i>Oregon.</i>									
Albany.....	Linn.....	65.5	12	67.8	+ 2.3	68.7	1888	62.5	1881
Eola.....	Polk.....	64.9	20	64.3	- 0.6	68.6	1870	61.2	1881
<i>Pennsylvania.</i>									
Dyberry.....	Wayne.....	64.4	22	63.0	- 1.4	68.3	1872	58.4	1866
Grampian Hills..	Clearfield....	67.6	26	66.1	- 1.5	73.1	1881	62.1	1866
Wellaborough....	Tioga.....	66.0	11	62.2	- 3.8	71.3	1881	62.2	1890
<i>South Carolina.</i>									
Statesburgh.....	Sumter.....	77.0	9	74.1	- 2.9	79.7	1881	73.5	1889
<i>Tennessee.</i>									
Austin.....	Wilson.....	78.7	19	76.1	- 2.6	84.6	1881	75.8	1889
<i>Texas.</i>									
New Utm.....	Austin.....	82.4	18	82.5	+ 0.1	84.4	1873	79.4	1879, '82
<i>Vermont.</i>									
Strafford.....	Orange.....	67.6	17	65.9	- 1.7	72.6	1884	63.9	1885
<i>Virginia.</i>									
Birdsneest.....	Northampton	76.6	22	75.3	- 1.3	80.1	1877, '78	65.3	1871
<i>Washington.</i>									
Fort Townsend..	Jefferson....	61.4	17	61.0	- 0.4	64.3	1874	58.9	1876
<i>Wisconsin.</i>									
Madison.....	Dane.....	69.1	18	66.0	- 3.1	72.2	1878	64.2	1885

MAXIMUM AND MINIMUM TEMPERATURES.

The highest temperature reported by a regular station of the Signal Service was 110, at Yuma, Ariz., on the 29th. The maximum temperature rose to or above 100 in the lower Rio Grande valley, from north Texas northward over the Dakotas, from southern Nev. southward over southeast Cal. and west Ariz., over parts of the middle and northern plateau regions, and in the Sacramento and San Joaquin valleys. The lowest maximum temperature, 65, was reported at Eureka, Cal.; the maximum temperature was 68 at Point Reyes Light, Cal., and Tatoosh Island, Wash., and below 80 at stations on the southeast New England coast. The reports of United States Army post surgeons and state weather service and voluntary observers show the following maximum temperatures in states and territories where temperature rising to or above 100 was reported: Volcano Springs, Cal., 120; Gove City, Kans., 119; Fort Mojave, Ariz., 112; El Dorado Canyon, Nev., 110; Saint George, Utah, Guthrie, Ind. T., and several stations in Nebr.,

108; Tipton, Pa., 107; Payette, Idaho, Princeton, Mo., Glendive, Mont., Fort Seldon, N. Mex., Fort Bennett and Millbank, S. Dak., and Haskell, Tex., 106; Fort A. Lincoln, N. Dak., 105; Lead Hill, Ark., Bennet and First View, Colo., Atwood and East Peoria, Ill., and Fort D. A. Russell, Wyo., 104; North Lewisburgh, Ohio, 103; several stations in Iowa, Cameron, La., Adrian, Mich., and Albany, Oregon, 102; Pellville, Ky., and Vaiden, Miss., 101; Eastman and Louisville., Ga., Angola and Huntingburgh, Ind., Madison Barracks and Marshland, N. Y., and Fort Walla Walla, Wash., 100.

At the following-named stations of the Signal Service the maximum temperature for the current month was as high or higher than previously reported for August during the respective periods of observation: La Crosse, Wis., 18 years, 96, the same as 1887; Dubuque, Iowa, 18 years, 99, the same as 1887; Huron, S. Dak., 10 years, 102, 2 above 1886; Colorado Springs, Colo., 6 years, 96, 2 above 1889; Salt Lake City, Utah, 17 years, 100, the same as 1875; Astoria, Oregon, 7 years, 83, 3 above 1886; and Portland, Oregon, 19 years, 96, 2 above 1885. Among extremely high temperatures reported at regular stations of the Signal Service for August of preceding years are: 118 at Fort McDowell, Ariz., in 1886; 116 at Phoenix, Ariz., in 1883; 115 at Yuma, Ariz., in 1879; 111 at Fresno, Cal., in 1888; 110 at Red Bluff, Cal., in 1878; and 110 at Umatilla, Oregon, in 1882. Among high temperatures reported for August by United States Army post surgeons and voluntary observers are: 126 at Volcano Springs, Cal., in 1889; 121 at Fort Boise, Idaho, in 1871; 119 at Fort Mojave, Ariz., in 1875; and 115 at Fort Lapwai, Idaho, in 1882.

The lowest temperature reported by a regular station of the Signal Service was 30, at Saint Vincent, Minn., on the 22d. The minimum temperature was below 40 in north New England, the northern part of the upper lake region, in the Red River of the North and upper Missouri valleys, from Wyoming southward over west-central Colo. to north N. Mex., and in parts of the middle and northern plateau regions. The minimum temperature was highest along the west Gulf coast, where it was above 70, and it reached 70 at Titusville and Key West, Fla. The reports of United States Army post surgeons and state weather service and voluntary observers show the following minimum temperatures in states and territories where temperature falling to or below 32 was reported: 24 at Alma, Colo., and Bonanza, Idaho; 29 at Pioche, Nev.; 30 at Evert, Lathrop, and Roscommon, Mich., Fort Pembina, N. Dak., and Greenwood, Wis.; 31 at Coolidge, N. Mex., Fort D. A. Russell, Wyo., and Webster, S. Dak.; and 32 at Berlin Mills and Berlin Falls, N. H.

At the following named stations of the Signal Service the minimum temperature for the current month was as low or lower than previously reported for August during the respective periods of observation: New York City, 20 years, 51, the same as 1885; Philadelphia, Pa., 20 years, 51, the same as 1885; Baltimore, Md., 20 years, 51, 1 below 1874; Washington City, 20 years, 49, 1 below 1874; Lynchburgh, Va., 20 years, 47, 3 below 1887; Southport, N. C., 15 years, 58, the same as 1883; Savannah, Ga., 20 years, 63, the same as 1879; Jacksonville, Fla., 19 years, 64, the same as 1889; Key West, Fla., 20 years, 70, the same as 1889; Galveston, Tex., 20 years, 70, the same as 2 or more years; Chattanooga, Tenn., 12 years, 56, 1 below 2 or more years; Memphis, Tenn., 20 years, 58, 1 below 1887; Nashville, Tenn., 20 years, 54, 1 below 1883; Indianapolis, Ind., 20 years, 46, 2 below 1885; Cincinnati, Ohio, 20 years, 51, the same as 1885; Pittsburgh, Pa., 20 years, 45, 1 below 1887; Erie, Pa., 18 years, 47, the same as 1887; Cleveland, Ohio, 20 years, 46, the same as 2 or more years; Sandusky, Ohio, 14 years, 48, the same as 1882; Escanaba, Mich., 20 years, 34, 4 below 2 or more years; Grand Haven, Mich., 20 years, 42, the same as 1875; Springfield, Ill., 12 years, 48, the same as 1885; Yankton, S. Dak., 18 years, 41, the same as 1886; Colorado Springs, Colo., 6 years, 44, 1 below 1888; Fort Grant, Ariz., 11 years, 54, 1 below 1882; Wilcox, Ariz., 7 years, 44, 4 below 1888.

RANGES OF TEMPERATURE.

The greatest and least daily ranges of temperature at regular stations of the Signal Service are given in the table of Signal Service data. The greatest monthly ranges of temperature occurred in the Dakotas, where they exceeded 60, whence they decreased eastward to less than 30 on the southeast and extreme east coasts of New England, southeastward and southward to less than 20 over extreme southern Florida and along the east and west Gulf coasts, southwestward to less than 40 over the southern plateau and on the extreme south Pacific coast, and westward to 20 on the coast of north California, and to less than 30 on the extreme north Pacific coast.

FROST.

The night of the 15-16th frost injured vines, buckwheat, potatoes, and corn at Canton, Saint Lawrence Co., N. Y. On the 17th light frost, the first frost of the season, occurred at Saint Vincent, Minn. On the 18th light frost was reported in north Michigan, and the first light frost of the season occurred at Sault de Ste. Marie, Mich. On the 19th light frost was reported in the Dakotas. On the 20th light frost was reported in central and northeast Wisconsin and in east upper Michigan. On the 22d heavy frost, the first of the season, occurred at Saint Vincent, Minn., and light frost was reported at Marshall, Minn.; heavy frost occurred at Saint Lawrence, S. Dak., injuring corn; the first light frost of the season occurred at Huron, S. Dak., and at Moorhead, Minn. On the 23d the first light frost of the season occurred at Grand Haven and Detroit, Mich., and frost injured buckwheat and tender plants at Manton, Mich. On the 24th light frost caused slight damage to vegetation at Alpena, Mich., and light frost was reported in some parts of Pennsylvania. On the 31st light frost was reported at Sault de Ste. Marie, Mich.

Over the eastern part of the country light frost was reported

as far south as north-central Va. on the 24th; in the central valleys to east-central Ill. on the 23d and 28th; generally in the Dakotas and Minn. on the 22d, and in the upper lake region on the 23d; to north-central Colo. on the 26th; in north-east Nev. from the 22d to 25th; and to extreme north-central Cal. on the 31st. Compared with the preceding month the southern limit of frost for August, 1890, was slightly farther south in the Atlantic coast states. No frost was reported in the central valleys in the preceding month. In the plateau region the southern limit was about the same for each month.

The damaging frost of the 15-16th in Saint Lawrence Co., N. Y., was about one month earlier; the heavy frost of the 22d at Saint Vincent, Minn., was about 10 days earlier; that of the 22d at Saint Lawrence, S. Dak., was about 2 weeks earlier; that of the 23d at Manton, Mich., and that of the 24th at Alpena, Mich., was about one week earlier than the average date of first killing frost in the respective localities.

TEMPERATURE OF WATER.

The following table shows the maximum, minimum, and mean water temperature as observed at the harbors of the several stations; the monthly range of water temperature; and the mean temperature of the air for August, 1890:

Stations.	Temperature at bottom.				Mean temperature of air at the station.
	Max.	Min.	Range.	Monthly mean.	
Boston, Mass.	66.0	59.5	6.5	63.9	68.9
Canby, Fort, Wash.	66.5	63.6	2.9	64.7	58.6
Charleston, S. C.	86.8	80.1	6.7	84.7	79.8
Eastport, Me.	53.2	50.1	3.1	52.1	61.4
Galveston, Tex.	88.0	85.0	3.0	86.6	82.6
Key West, Fla.	89.2	83.8	5.4	86.2	81.8
Portland, Oregon	72.0	67.0	5.0	69.9	65.9

PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for July, 1890, as determined from the reports of nearly 2,000 stations, is exhibited on chart III. In the table of Signal Service data the total precipitation and the departure from the normal are given for each Signal Service station. The figures opposite the names of the geographical districts in the columns for precipitation and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal and subtracting when above.

The heaviest precipitation reported was 15.39, at Sarcocoe, southwest Mo., and Mount Washington, N. H., and the precipitation exceeded 10.00 in north-central Mass., western W. Va., northeast N. C., central Miss., southeast La., southwest Tenn., west-central Ark., southeast Kans., and central Wis. At scattered stations in the Pacific coast states and the plateau region no precipitation was reported, and less than 0.50 fell along the Pacific coast (save on the Washington coast, where it exceeded 2.00), over a greater part of the northern and middle plateau, in southern Mont., southwest N. Dak., northwest S. Dak., the lower Rio Grande valley, southern Ark., and northwest Kans.

Over the central and eastern parts of the country large excesses and marked deficiencies in precipitation occurred in small areas, and in many instances the rainfall was unusually heavy in a portion of a state, while in other parts of the state and at neighboring stations it was deficient. Over the northern plateau and thence southeastward over N. Mex. and southern Tex., and on the middle and extreme south Pacific coasts the rainfall was deficient, while from the Cal. coast between San Diego and San Francisco eastward over the west part of the middle plateau and the west and south parts of

the southern plateau, and along the immediate north Pacific coast it was in excess of the average for August. The greatest excess in precipitation occurred in west-central Ark., where it exceeded 8.00, and at Fort Smith, Ark., 9 years record, the rainfall for the month was 4.63 greater than previously reported for August. In the middle Saint Lawrence valley the excess was 5.91 at Montreal and 4.18 at Quebec; and on the south-central coast of Nova Scotia, along the immediate Atlantic coast from Norfolk, Va., to Atlantic City, N. J., and in the Mississippi Valley from Vicksburg, Miss., to Cairo, Ill., it was more than 3.00. The greatest deficiency in precipitation occurred on the Ga. and east-central and extreme western Fla. coasts, where it was more than 4.00; and the deficiency exceeded 2.00 at stations on the south New England coast, along the south Atlantic and Fla. coasts, and in the lower Rio Grande, upper Mississippi, and middle Missouri valleys. At the following-named stations the precipitation was the heaviest reported for August during the respective periods of observation: Mount Washington, N. H., Strafford, Vt., Statesburgh, S. C., Fort Smith, Ark., Cheyenne, Wyo., Colorado Springs, Colo., Fort Thomas and Wilcox, Ariz., and Keeler, Cal. At Sacramento, Cal., trace of rainfall fell, and trace is the greatest amount of rainfall reported at that station for August. At Red Bluff and San Francisco, Cal., no precipitation occurred, and no precipitation was reported for August of several preceding years.

Considered by districts, the average percentage of the normal in districts where the precipitation was in excess for August, 1890, was about as follows: north Pacific coast, 157 per cent.; Ohio Valley and Tennessee, 140 per cent.; southern plateau, 127 per cent.; middle Atlantic states, 124 per cent.; middle-eastern slope of the Rocky Mountains, 121 per cent.; west Gulf states, 118 per cent.; and lower lake region,

111 per cent. In districts where the precipitation was deficient the percentage of the normal was about as follows: south Pacific coast, 20 per cent.; Rio Grande Valley, 26 per cent.; Key West, 44 per cent.; northern plateau, 62 per cent.; Missouri Valley, 67 per cent.; extreme northwest, 71 per cent.; south Atlantic states, 77 per cent.; east Gulf states and southeast slope of the Rocky Mountains, 81 per cent.; New England, 84 per cent.; northeast slope of the Rocky Mountains and the upper Mississippi valley, 92 per cent.; middle plateau, 85 per cent.; and upper lake region, 93 per cent. On the middle Pacific coast the precipitation averaged trace, while the normal amount for that district is 0.01.

For the period, January to August, 1890, inclusive, the precipitation on the middle Pacific coast averaged about $\frac{1}{4}$ greater, and in the lower lake region and the Ohio Valley and Tennessee $\frac{1}{10}$ to $\frac{2}{10}$ greater than the average, while in the south Atlantic and east Gulf states, at Key West, Fla., in the Rio Grande and Missouri valleys, the middle-eastern and northeastern slopes of the Rocky Mountains, in the middle plateau, and on the south Pacific coast it averaged about $\frac{3}{4}$ of the normal amount for the period named.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows for certain stations, as reported by voluntary observers, (1) the average precipitation for August for a series of years; (2) the length of record during which the observations have been taken and from which the average has been computed; (3) the total precipitation for August, 1890; (4) the departure of the current month from the average; (5) and the extremes for August during the period of observation and the years of occurrence:

State and station.	County.	(1) Average for the month of Aug.	(2) Length of record.	(3) Total for Aug., 1890.	(4) Departure from average.	(5) Extremes for Aug.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
<i>Arkansas.</i>		<i>Inches</i>	<i>Years</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>		<i>Inches</i>	
Lend Hill	Boone	6.06	8	5.73	-0.33	11.53	1888	3.91	1886
<i>California.</i>									
Sacramento	Sacramento ..	T.	40	T.	0.00	0.08	1864	0.00	*
<i>Connecticut.</i>									
Middletown	Middlesex	5.43	28	4.66	-0.77	10.22	1867	1.16	1865
<i>Florida.</i>									
Merritt's Island ..	Brevard	6.60	12	2.21	-4.39	15.77	1880	1.15	1883
<i>Georgia.</i>									
Forayth	Monroe	4.91	16	2.74	-2.07	7.46	1879	2.50	1888
<i>Illinois.</i>									
Peoria	Peoria	3.06	34	2.39	-0.67	9.04	1862	0.57	1883
Riley	McHenry	4.02	39	3.83	-0.19	15.73	1850	0.77	1889
<i>Indiana.</i>									
Logansport	Cass	3.11	16	3.67	-0.44	6.30	1886	0.67	1881
Vevay	Switzerland ..	3.25	25	3.46	+0.21	10.90	1875	0.02	1889
<i>Iowa.</i>									
Cresco	Howard	3.18	17	2.79	-0.39	8.34	1884	0.92	1889
Monticello	Jones	3.83	25	4.97	+1.14	8.54	1885	0.22	1889
Logan	Harrison	4.46	23	1.19	-3.27	5.15	1889	0.61	1885
<i>Kansas.</i>									
Lawrence	Douglas	3.76	25	6.19	+2.43	9.07	1888	0.09	1882
Wellington	Sumner	3.01	11	2.90	-0.11	5.15	1888	0.61	1885
<i>Louisiana.</i>									
Grand Coteau	St. Landry ..	3.77	7	5.29	+1.52	8.07	1888	0.42	1883
<i>Maine.</i>									
Orono	Penobscot	3.54	20	5.47	+1.93	7.36	1885	0.53	1883
<i>Maryland.</i>									
Cumberland	Allegany	3.06	19	7.07	+4.01	8.09	1882	0.31	1881
<i>Massachusetts.</i>									
Amherst	Hampshire	4.41	54	5.54	+1.13	12.13	1856	0.25	1882
Newburyport	Essex	3.54	12	4.83	+1.29	7.57	1887	0.75	1883
Somerset	Bristol	4.28	18	3.45	-0.83	8.08	1880	0.58	1882
<i>Michigan.</i>									
Kalamazoo	Kalamazoo	2.68	14	2.81	+0.13	8.94	1885	0.31	1889
Thornville	Lapeer	3.01	13	4.56	+1.55	6.69	1877	0.35	1889
<i>Minnesota.</i>									
Minneapolis	Hennepin	3.79	24	2.59	-1.20	11.64	1869	0.47	1883
<i>Montana.</i>									
Fort Shaw	Lewis & Clarke	0.76	20	2.40	+1.64	3.01	1876	0.00	'71, '89
<i>New Hampshire.</i>									
Hanover	Grafton	3.67	45	7.77	+4.10	9.46	1849	0.12	1854
<i>New Jersey.</i>									
Moorestown	Burlington ..	4.62	27	5.49	+0.87	9.44	1882	0.81	1881
South Orange	Essex	5.33	19	4.43	-0.90	12.55	1875	1.10	1886
<i>New York.</i>									
Cooperstown	Otsego	3.82	36	6.01	+2.19	9.46	1856	0.63	1876
Palermo	Oswego	2.56	36	1.95	-0.61	6.40	1864	0.41	1866
<i>North Carolina.</i>									
Lenoir	Caldwell	5.68	18	9.80	+4.12	10.20	1886	2.10	1877
<i>Ohio.</i>									
N. Lewisburgh ..	Champaign ..	3.63	18	3.05	-0.58	7.55	1882, '85	0.80	1884
Wauseon	Fulton	2.81	18	3.48	+0.67	4.86	1886	1.12	1884

Deviations from average precipitation—Continued.

State and station.	County.	(1) Average for the month of Aug.	(2) Length of record.	(3) Total for Aug., 1890.	(4) Departure from average.	(5) Extremes for Aug.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
<i>Oregon.</i>		<i>Inches</i>	<i>Years</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>		<i>Inches</i>	
Albany	Linn	0.51	11	0.28	-0.23	1.62	1881	0.00	'85, '88
Eola	Polk	0.43	21	0.01	-0.42	1.81	1879	0.00	*
<i>Pennsylvania.</i>									
Dyberry	Wayne	3.71	18	6.35	+2.64	8.77	1885	0.95	1883
Gramplan Hills ..	Clearfield	4.24	20	6.41	+2.17	8.19	1888	1.60	1883
Wellsbrough	Tioga	5.12	11	6.89	+1.77	15.25	1885	0.83	1889
<i>South Carolina.</i>									
Statesburgh	Sumter	4.03	9	7.07	+3.04	7.07	1890	2.12	1886
<i>Tennessee.</i>									
Austin	Wilson	3.67	21	4.70	+1.03	7.80	1871	0.50	1881
<i>Texas.</i>									
New Ulm	Austin	3.13	18	3.86	+0.73	8.38	1878	0.09	1885
<i>Vermont.</i>									
Stratford	Orange	3.43	17	8.85	+5.42	8.85	1890	1.40	1882
<i>Virginia.</i>									
Birdsnest	Northampton	4.58	21	4.05	-0.53	11.25	1875	0.20	1869
<i>Washington.</i>									
Fort Townsend ..	Jefferson	0.83	16	0.30	-0.53	3.12	1879	0.00	1885
<i>Wisconsin.</i>									
Madison	Dane	3.25	19	4.25	+1.00	6.83	1882	0.56	1881

*Generally.

EXCESSIVE PRECIPITATION.

Precipitation to equal or exceed 10 was reported at 2 stations in Ark., Kans., La., Miss., and Mo., and at one station in Mass., N. H., N. C., Tenn., W. Va., and Wis.; the greatest, 15.39, being reported at Mount Washington, N. H., and Sarcosie, Mo.

In August of previous years precipitation to equal or exceed 10 has been reported for 31 years in Fla.; for 22 years in Ga.; for 20 years in S. C.; for 16 years in N. C. and Ala.; for 15 years in N. Y.; for 13 years in Iowa; for 11 years in Va.; for 10 years in N. J., La., and Tex.; for 5 to 9 years in Conn., Ill., Ind., Kans., Md., Mass., Nebr., N. H., Ohio, and Pa.; and for one to 4 years in Ariz., Ark., Colo., the Dakotas, Del., D. C., Ind. T., Ky., Me., Mich., Minn., Miss., Mo., N. Mex., Tenn., Vt., W. Va., and Wis. In states and territories other than those named precipitation to equal or exceed 10 has not been reported for August of preceding years. Among the heavier rainfalls reported for August of preceding years are: 30.73 at Fort Barrancas, Fla., in 1878; 28.65 at Asheville, N. C., in 1887; 28.33 at Elsworth, N. C., in 1880; 25.07 at Fort Barrancas, Fla., in 1879; 24.42 at Fort Moultrie, S. C., in 1859; 23.75 at U. S. Naval Hospital, near Portsmouth, Va., in 1867; 23.44 at Maurepas, La., in 1888; 23.40 at Fort Brooke, Fla., in 1840; 23.25 at Newport, Fla., in 1872; 23.04 at Charleston, Ill., in 1882; 23.00 at New Smyrna, Fla., in 1871; 22.74 at New Orleans, La., in 1888; 22.73 at Tarborough, N. C., in 1887; 22.48 at Newark, N. J., in 1843; 21.50 at Saint Augustine, Fla., in 1871; 21.35 at Fairview, Fla., in 1871; and 20.37 at Savannah, Ga., 1841. Exclusive of the instances and years cited monthly rainfall to exceed 15.00 in August has been reported for 6 years in Fla.; for 4 years in Ga., S. C., and Tex.; for 2 years in Conn., Ind., La., Mass., N. Y., Pa., and Va.; and for one year in Ala., Ill., Iowa, Kans., Md., Miss., Nebr., N. H., N. J., N. C., Ohio, Tenn., and Wis.

Precipitation to equal or exceed 2.50 in 24 hours was reported at 15 stations in Miss., and on 5 dates, the 4th, 7th, 19th, 27th, and 28th; at 13 stations in La., and on 6 dates, the 11th, and 24th to 28th; at 10 stations in Kans., and on 12 dates, the 3d, 4th, 9th to 11th, 16th to 20th, 25th, and 26th; at 10 stations in Mo., and on 10 dates, the 6th, 10th, 12th to 16th, 20th, 25th, and 26th; at 10 stations in Ohio, and on 6 dates, the 9th, 20th, 21st, 25-26th, and 27th; at 9 stations in Tenn., and on 9 dates, the 1st, 4th, 5th, 7th, 18th, 22d, and 26th to 28th; at 7 stations in Mich., and on 5 dates, the 3d-4th, 19-20th, and 21st; at 7 stations in N. C., and on 8 dates, the 2d, 3d, 7th, 8-9th, 28th, and 29-30th; at 7 stations in Pa., and on 5 dates, the 4th, 5th, 8th, 18th, and 26th; at 5 stations in Iowa, and on 3 dates, the 3d, 16th, and 24th; at 5 stations in Ind., and on 4 dates, the 8th, 19th, 20th, and 26th; at 4 sta-

tions in Mass., and on 5 dates, the 10th, 17-18th, and 19-20th; at 3 stations in Ga., and on 2 dates, the 4th and 29th; at 3 stations in Ill., and on 2 dates, the 26th and 27th; at 3 stations in Wis., and on 4 dates, the 2d, 3d, 7-8th, and 8th; at 2 stations in Ala., and on 2 dates, the 2d and 15th; at 2 stations in Fla., and on 2 dates, the 16th and 31st; at 2 stations in Md., and on 3 dates, the 21st and 25-26th; at 2 stations in N. J., and on 3 dates, the 19-20th and 27th; at 2 stations in Tex., and on 3 dates, the 28-29th and 30th; at 1 station in Ariz., on the 24-25th; at 1 station in Ark., on the 19-20th; at 1 station in Colo., on the 13-14th; at 1 station in Ind. T., on the 25th; at 1 station in Nebr., on the 17th; at 1 station in N. H., on the 27th; at 1 station in S. C., on the 28-29th; and at 1 station in W. Va., on the 25-26th. Among the heavier rainfalls reported for this period are: 8.10 at Vesper, Kans., on the 19th; 6.00 at Hazelhurst, Miss., on the 27th; 6.00 at Phillips, Wis., on the 8th; 5.10 at Fort Smith, Ark., on the 19-20th; 5.00 at Austin, Mo., on the 25-26th; 4.98 at Gettysburgh, Pa., on the 8th; 4.96 at Washington, Mich., on the 3d-4th; 4.40 at Diamond, Ga., on the 29th; 4.15 at Abbeville, La., on the 11th; and 4.04 at Mount Washington, N. H., on the 27th.

In August of preceding years precipitation to equal or exceed 2.50 in 24 hours has been reported for 19 years in Pa.; for 18 years in Ga., S. C., and Tex.; for 17 years in Mo.; for 16 years in Fla., N. J., and N. C.; for 14 years in Kans., N. Y., and Ohio; for 13 years in Iowa and Miss.; for 12 years in the Dakotas, Mass., and Tenn.; for 11 years in Ala., Conn., Ill., and Minn.; for 10 years in Mich. and Va.; for 5 to 9 years in Ark., Del., Ind., Ind. T., La., Md., Nebr., N. H., W. Va., and Wis.; and for 1 to 4 years in Ariz., Ky., Me., Mont., R. I., and Vt. In states and territories other than those named precipitation to equal or exceed 2.50 in 24 hours has not been reported for August of preceding years. Among the heavier rainfalls reported for this period in August of preceding years are: 10.38 at Griffin, Ga., 8th, 1883; 10.15 at Granbury, Tex., 26th, 1888; 9.75 at Fort Barrancas, Fla., 29th, 1878; 9.14 at Hatteras, N. C., 23d, 1880; 9.00 at Tecumseh, Nebr., 12th, 1889; 9.00 at Elsworth, N. C., 4th, 1880; 8.90 at New Orleans, La., 20th, 1888; 8.54 at Mandeville, La., 8th, 1888; 8.46 at Cape May, N. J., 18th, 1879; 8.14 at Kitty Hawk, N. C., 15th, 1883; 7.75 at Grantsburgh, Wis., 19-20th, 1889; 7.70 at Johnstown, Va., 18th, 1879; and 6.50 at Carson, Iowa, 9th, 1889. Exclusive of the instances and years cited, precipitation to equal or exceed 5.00 in the period named has been reported for 6 years in N. C.; for 4 years in Ill., Mass., and S. C.; for 2 years in Ala., Fla., Kans., N. Y., Tex., and Va.; and for 1 year in Conn., the Dakotas, Iowa, Me., Md., Mo., Nebr., N. J., Pa., and Tenn.

Precipitation to equal or exceed 1.00 in 1 hour was reported at 11 stations in Tex., and on 6 dates, the 3d, 4th, 19th, 25th, 26th, and 28th; at 8 stations in Tenn., and on 7 dates, the 1st to 3d, 5th, 9th, 10th, and 17th; at 7 stations in Pa., and on 4 dates, the 5th, 6th, 19th, and 21st; at 6 stations in Kans., and on 5 dates, the 4th, 16th, 23d, 24th, and 26th; at 5 stations in Miss., and on 4 dates, the 3d, 8th, 9th, and 16th; at 5 stations in Ohio, and on 5 dates, the 2d, 19th, 21st-22d, and 26th; at 4 stations in Colo., and on 3 dates, the 13th, 14th, and 16th; at 4 stations in Ga., and on 3 dates, the 1st, 4th, and 7th; at 4 stations in Iowa, and on 3 dates, the 3d, 16th, and 17th; at 4 stations in Mo., and on 4 dates, the 6th, 8th, 13th, and 16th; at 4 stations in S. C., and on 7 dates, the 8th to 11th, 19th, 20th, and 28th; at 3 stations in Ala., and on 3 dates, the 2d, 9th, and 15th; at 3 stations in Ariz., and on 2 dates, the 7th and 20th; at 3 stations in La., and on 3 dates, the 2d, 16th, and 17th; at 3 stations in N. J., and on 2 dates, the 1st and 27th; at 3 stations in N. C., and on 2 dates, the 3d and 6th; at 2 stations in Fla., and on 2 dates, the 2d and 16th; at 2 stations in Ill., and on 2 dates, the 17th and 26th; at 2 stations in Md., on the 21st; at 2 stations in Mass., and on 2 dates, the 1st and 23d; at 2 stations in W. Va., and on 2 dates, the 1st and 21st; at 1 station in Ind., on the 26th; at 1 station in Ky.,

on the 3d; at 1 station in N. Y., on the 14th; at 1 station in S. Dak., on the 10th; at 1 station in Vt., on the 6th; at 1 station in Va., on the 2d; and at 1 station in Wis., on the 3d. Among the heavier rainfalls reported for 1 hour or less are: 0.35 in 5 minutes, at Philadelphia, Pa., 21st; 1.41 in 18 minutes, at Charleston, S. C., 9th; 1.05 in 20 minutes, at Emporium, Pa., 5th; 1.01 in 20 minutes, at Parkersburgh, W. Va., 1st; 1.00 in 20 minutes, at Mossing Ford, Va., 2d; 1.52 in 24 minutes, at Hardin, Colo., 13th; 1.56 in 30 minutes, at Queensbury, N. Y., and 2.75 to 3.00 in 30 minutes, at Colorado Springs, Colo., 14th; 2.01 in 45 minutes, at Charlotte, N. C., 3d. 3.18 fell in 1 hour and 10 minutes, at Colorado Springs, Colo., 14th; and 4.50 in 1 hour and 30 minutes, at Plover, Wis., 3d.

In August of preceding years precipitation to equal or exceed 1.00 in one hour has been reported for 15 years in Tex.; for 14 years in Pa.; for 13 years in Kans.; for 12 years in Fla., Ga., and Tenn.; for 11 years in Mo.; for 10 years in Ohio; for 5 to 9 years in the Dakotas, Ill., Ind., Iowa, Md., Mich., Miss., Nebr., N. Y., N. C., S. C., and Va.; and for one to 4 years in Ala., Ariz., Ark., Colo., Conn., Del., D. C., Ind. T., Ky., La., Me., Mass., Minn., Mont., N. H., N. J., N. Mex., R. I., and Wis. In states and territories other than those named precipitation to equal or exceed 1.00 in the period named has not been reported for August of preceding years. Among the heavier rainfalls reported for one hour or less in August of preceding years are: for 5 minutes, 0.45 at New York City, 5th, 1884; 0.43 at New York City, 18th, 1887. For 10 minutes, 2.48 at Norfolk, Va., 20th, 1888; 0.59 at New York City, 4th, 1888; 0.50 at Salisbury, N. C., 13th, 1888; 0.40 at New York City, 21st, 1888. For 15 minutes, 5.05 at Saint Louis, Mo., 15th, 1848; 2.12 at Mesquite, Tex., 11th, 1875; 1.40 at Osage, Iowa, 26th, 1881. 1.00 in 18 minutes at Lead Hill, Ark., 2d, 1882. For 20 minutes, 1.27 at Escanaba, Mich., 11th, 1877; 1.25 at Albany, N. Y., 2d, 1878. 1.26 in 23 minutes at Louisville, Ky., 20th, 1878. For 25 minutes, 1.55 at Galveston, Tex., 17th, 1871; 1.33 at Indianola, Tex., 18th, 1882. For 30 minutes, 2.50 at Mesquite, Tex., 10th, 1875; 1.90 at Vevay, Ind., 13th, 1879; 1.95 at Wellsborough, Pa., 21st, 1885; 1.88 at Grantsburgh, Wis., 7th, 1889; 1.52 at Mount Auburn, Ohio, 26th, 1880; 1.50 at Fort Ellis, Mont., 10th, 1883. For 35 minutes, 3.00 at Auburn, N. H., 27th, 1877; 2.20 at Hulmeville, Pa., 25th, 1880; 1.85 at Pittsburgh, Pa., 16th, 1884, and at Cincinnati, Ohio, 27th, 1882; 1.57 at Marietta, Ga., 13th, 1889. 3.50 in 36 minutes at Providence, R. I., 6th, 1878. 3.72 in 41 minutes at Jacksonville, Fla., 20th, 1873. 2.48 in 45 minutes at Detroit, Mich., 31st, 1878. For 50 minutes, 3.00 at Fort Delaware, Del., 31st, 1868; 2.34 at Fort Union, N. Mex., 12th, 1883. At Carson, Iowa, 6.50 fell in 4 hours, 9th, 1889.

Table of excessive precipitation, August, 1890.

State and station.	Monthly rainfall to inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
<i>Alabama.</i>	<i>Inches.</i>	<i>Inches.</i>		<i>Inches.</i>	<i>A. M.</i>	
Auburn.....	3.13	3	3-13	1.30		2
Montgomery.....	2.69	15	1.77	0.55		15
Mount Vernon Barracks.....			1.19	1.10		9
<i>Arizona.</i>						
Fairbank.....			1.50	1.00		7
Florence.....			1.00	0.30		20
Fort Lowell.....	2.50	24-25				
Grand Central Mill.....			1.50	1.00		7
<i>Arkansas.</i>						
Fort Smith.....	10.89	5-10	19-20			
Winslow.....	10.52					
<i>Colorado.</i>						
Colorado Springs.....	3.62	13-14	3.18	1.10		14
Eagle Farm.....			1.40	1.00		16
Hardin.....			1.52	0.24		13
Pueblo.....			1.00	1.00		13
<i>Florida.</i>						
Fort Meade.....	3.00	31				
Homeland.....			1.70	1.30		16
Jupiter.....			2.00	1.00		2
San Antonio.....	2.80	16				

Table of excessive precipitation—Continued.

State and station.	Monthly rainfall to inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
<i>Georgia.</i>						
Athens (1)	<i>Inches.</i>	<i>Inches.</i>		<i>Inches</i>	<i>h. m.</i>	
Augusta		3.04	29	1.40	1 05	7
Diamond		4.40	29	1.70	1 00	1
Macon				2.00	2 00	4
Point Peter		2.55	4	2.55	1 00	4
<i>Illinois.</i>						
Jordan's Grove		2.81	26			
Mount Carmel		2.96	26-27			
McLeansborough		2.84	26	2.84	2 00	26
Palestine				1.17	1 00	17
<i>Indiana.</i>						
De Gonia Springs		2.97	19-20			
Huntingburgh		3.00	26			
Indianapolis				1.50	1 25	26
La Fayette		3.25	8			
Marengo		2.50	19			
Princeton		2.45	26			
<i>Indian Territory.</i>						
Fort Gibson		2.57	25			
<i>Iowa.</i>						
Clarinda				1.45	0 50	17
Dubuque		2.60	3			
Eagle Grove		2.50	3			
Glenwood		3.30	16			
Manson		2.84	24			
Maquoketa		2.50	16	2.50	2 30	16
Sioux City				1.69	1 35	3
Storm Lake				1.05	1 00	3
<i>Kansas.</i>						
Columbus	11.00					
Conway		4.50	19-20			
Fort Riley		2.50	9-10			
Fort Leavenworth (1)		2.54	4			
Fort Leavenworth (2)				2.00	1 55	4
Kansas City				1.00	1 00	16
Kingman				1.50	1 00	24
La Harpe		3.08	16-17			
Larned				1.50	1 00	23
Leavenworth		2.70	3-4			
Lebo		3.58	10			
Macksville				1.25	1 00	23
Mankato		2.50	11			
Morse		3.95	25-26			
Peabody		2.75	18			
Vesper	10.80	8.10	19			
Wakefield				1.83	1 30	26
<i>Kentucky.</i>						
Eddyville				1.27	0 30	3
<i>Louisiana.</i>						
Abbeville		4.15	11			
Alexandria		2.90	27			
Amité City				1.00	1 00	16
Clinton		3.76	24			
Do		2.54	27			
Columbia		3.50	27			
Delhi		2.58	28			
Hammond		3.37	27			
Homer				1.90	1 25	17
Houma		3.53	26			
Jeanerette		3.11	26			
Marksville		3.50	27			
Melville				1.15	1 00	2
New Iberia		2.87	27			
Paincourtville	10.68	3.84	26-27			
Plaquemine	10.79	2.55	26			
Thibodeaux		3.48	25			
<i>Maryland.</i>						
Baltimore				1.96	1 10	21
Barren Creek Springs		2.56	25-26			
Woodstock		2.80	21	2.80	2 00	21
<i>Massachusetts.</i>						
Cotuit		2.95	10			
Dudley		2.50	17-18	1.00	1 00	23
Royalston	10.75	3.62	17-18			
Do		2.50	19-20			
Vineyard Haven		2.50	10	1.19	1 08	1
<i>Michigan.</i>						
Ball Mountain		4.42	3-4			
Birmingham		3.00	2-3			
Detroit (1)		2.72	21			
Detroit (2)		2.60	21			
Fort Wayne		2.87	19-20			
Grape		2.92	21			
Pontiac		3.42	4			
Washington		4.96	3-4			
<i>Mississippi.</i>						
Agricultural College		3.35	27			
Columbus (2)	10.47	3.15	4			
Corinth		4.10	7			
Fayette				1.52	1 00	16
Hazlehurst		6.00	27			
Holly Springs (2)		2.90	27-28			
Logtown				1.08	1 00	9
Louisville		4.00	27	1.05	1 00	8
Macon (1)		2.50	27			
Moss Point		2.80	19			
Natchez (1)		3.63	27			
Natchez (2)		3.75	27	1.50	1 00	3
Palo Alto		3.01	27			
Pearlington				1.08	1 00	9
Pontotoc		3.00	27			

Table of excessive precipitation—Continued.

State and station.	Monthly rainfall to inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Mississippi—Continued.		Inches.	Inches.	Inches	h. m.	
Rienzi.....			3.20	27		
Vaiden.....	10.01		4.07	27		
Washington.....			4.40	27		
Yazoo.....			3.72	28		
Missouri.						
Austin.....		2.50	16-17			
Do.....		5.00	25-26			
Bethany.....		3.75	12-13			
Bradleyville.....	13.00	3.00				
Do.....		3.50	20			
Brunswick.....		3.90	13			
Do.....		2.50	17			
Cassville.....		2.75	10			
Conception.....		2.56	16			
Grand Pass.....				1.00	0 42	16
Jerome.....		2.60	26			
Kansas City.....				1.27	0 46	16
Miami.....		3.90	12-13			
New Frankfort.....		3.50	13			
Sarcozie.....	15.39	2.63	6	2.63	1 35	6
Do.....		2.93	15-16	2.40	1 10	13
Do.....		3.40	26			
Stellada.....				1.07	0 50	8
Do.....				1.58	1 00	16
Nebraska.						
Plattsmouth.....		2.75	17			
New Hampshire.						
Mount Washington.....	15.39	4.04	27			
New Jersey.						
Atlantic City.....		2.76	27	2.70	1 50	27
Moorestown.....				2.46	2 10	1
New Brunswick.....		3.04	19-20			
Rancocas.....				1.75	1 00	1
New York.						
Queensbury.....				1.56	0 30	14
North Carolina.						
Charlotte.....				2.01	0 45	3
Douglas.....		2.50	7			
Fayetteville.....		2.50	3			
Hatteras.....		3.18	29			
Lumberton.....		3.12	29-30	1.58	1 00	6
Mount Airy.....		2.66	8-9			
Mount Pleasant.....				1.72	1 30	3
Salisbury.....		3.04	28			
Wileyton.....	10.72	2.60	2			
Ohio.						
Bucyrus.....		2.75	26			
Cincinnati.....		2.66	26	1.48	1 10	26
Circleville (1).....		2.51	27			
Circleville (2).....		3.44	26			
Demos.....		2.57	26			
Georgetown.....		2.70	9			
Granville.....		2.63	25-26			
Jefferson (1).....				1.81	1 30	19
Jefferson (2).....				1.66	1 30	21-22
Logan.....		3.99	26	3.45	3 00	26
Marietta.....		3.99	26	3.45	3 00	26
Marietta.....		2.60	20			
McConnelsville.....		2.51	26			
New Comerstown.....				2.04	1 15	19
Portsmouth.....				1.19	1 00	2
Wauseon.....		2.53	21			
Pennsylvania.						
Carlisle.....		3.04	8			
Emporium.....				1.05	0 20	5
Erie.....		2.57	4-5			
Gettysburgh.....		4.98	8			
Grampian Hills.....		2.58	5	1.63	0 40	5
Lewisburgh.....				1.30	1 00	19
Mauch Chunk.....		4.22	26			
Philadelphia.....				1.16	1 00	21
Somerset.....				1.60	1 00	6
South Eaton.....				1.75	1 00	9
Troy.....		4.40	18			
Uniontown.....		3.04	26			
York.....				1.33	1 00	21
South Carolina.						
Charleston.....				1.41	0 18	9
Do.....				1.61	1 20	19
Hardeeville.....				1.14	1 00	8
Do.....				1.48	0 40	11
Spartanburgh (2).....				1.30	0 45	20
Statesburgh.....				1.30	0 48	10
Do.....		3.22	28-29	2.00	0 45	28
South Dakota.						
Rapid City.....				1.17	1 06	10
Tennessee.						
Andersonville.....				1.90	1 30	5
Austin.....				1.50	1 30	17
Bolivar (2).....	12.35	3.95	7			
Clarksville.....		3.00	1	1.10	1 00	17
Do.....		2.60	22			
Fayetteville.....		2.78	28			
Florence Station.....		2.52	4			
Do.....		3.45	5			
Grief.....		2.50	28			
Memphis.....		2.65	26-27	1.75	1 15	2
Milan (2).....		3.15	18			
Nunnely.....		2.53	26			
Riddleton.....				1.20	0 35	9
Sharps.....				1.35	1 10	3

Table of excessive precipitation—Continued.

State and station.	Monthly rainfall to inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Tennessee—Continued.						
Springdale	Inches.	Inches.		Inches.	A. M.	
Do.		2.69	5			
Trenton		2.75	27	1.96	1 30	1
Texas.						
Brady		2.53	28-29			
Coldwater				1.18	0 40	25
Corpus Christi				1.00	0 55	31
Forestburg				1.50	1 15	19
Fort Elliott				1.03	1 00	25
Gainesville				1.25	0 30	4
Galveston				1.75	1 00	4
La Grange		2.90	30	3.90	2 30	30
Luling				1.04	1 00	30
New Braunfels				1.39	1 30	26
Palestine				1.56	1 15	3
Round Rock				1.08	0 30	28
Vermont.						
Stratford				1.20	1 00	6
Virginia.						
Mossing Ford				1.00	0 20	2
West Virginia.						
Ellis		3.98	25-26	1.00	1 00	21
Glenville				1.01	0 20	1
Parkersburg						
Point Pleasant	10.26					
Wisconsin.						
Grantsburg		4.50	7-8			
Phillips		6.00	8			
Plover	10.91	3.05	3	4.50	1 30	3
Do		4.50	3			

Reports received too late to be used in general discussion for August, 1890.

Indiana.						
Vincennes		2.83	27			

Received too late for publication in July Review.

Arizona.						
Crittenden				1.60	0 30	17
North Carolina.						
Douglas	11.65	2.50	24			
Highland	14.48	3.35	23-24			
Marion		3.10	5			
Do.		3.02	24			
Raleigh	11.30					
Smithfield	10.05					
Wisconsin.						
Grantsburg				2.00	1 20	16

HAIL.

Description of the more severe hail storms of the month is given under "Local storms." Hail was reported as follows: 1st, Pa. 2d, Ill., Iowa, Nebr., Va. 3d, Ga., Iowa, Minn., Va., S. Dak., Va., Wis. 4th, Colo., Kans., Mich., Mo., N. B. 5th, N. Y. 6th, Ala., Iowa, N. Dak. 7th Minn., Nev., S. Dak., Wis. 8th, Ala., Ariz., Ind., Mich., Mo., Wis. 9th, Ky., N. Y.

10th, Conn., Md., Mass., N. Dak., N. J., N. Y., S. Dak. 11th, Ariz., Colo., Nebr. 12th, Colo., Nev. 13th, Colo., Kans., Mo., Nev. 14th, Colo., Nev., N. Y. 15th, Colo., S. Dak. 16th, Colo., Wyo. 17th, Ill., N. Y., Tex. 18th, Colo., Kans. 19th, Colo. 20th, Va. 21st, Md., N. Y., Pa. 22d, Nebr., Nev., N. Dak., Tex. 23d, Kans., Mont., S. Dak. 24th, Nebr., N. Dak., S. Dak. 25th, Colo., Kans., Mo., Nev., N. Mex. 26th, Colo. 27th, Tex. 28th, Kans., Mich. 29th, Nev., N. Dak., Tex. 30th, Tex., Wash.

SNOW.

The Signal Service observer at Harrisburg, Pa., reports that a few flakes of snow fell at that place the morning of the 23d; snow flurries were also reported in Northampton and Northumberland counties, Pa., on the 23d. The Signal Service observer at Sault de Ste. Marie, Mich., states that light snow was reported along the upper Saint Marie River the evening of the 9th.

SLEET.

Sleet was reported at Moorhead, Minn., 24th, and in Colo. on the 27th.

MAXIMUM RAINFALL IN ONE HOUR OR LESS.

The following table is a record of the heaviest rainfall during August, 1890, for periods of five and ten minutes and one hour, as reported by regular stations of the Signal Service furnished with self-registering gauges:

Station.	Maximum fall in—					
	5 min.	Date.	10 min.	Date.	1 hour.	Date.
Bismarck, N. Dak.	Inch.		Inch.		Inch.	
Boston, Mass.	0.05	23	0.10	23	0.20	23
Buffalo, N. Y.	0.05	20	0.10	20	0.31	20
Cincinnati, Ohio	0.20	21	0.30	5	0.60	5
Chicago, Ill.	0.25	26	0.40	26	1.10	26
Cleveland, Ohio	0.20	21	0.27	21		
Denver, Colo.	0.25	4	0.40	4	0.60	4
Detroit, Mich.	0.17	11	0.30	11	0.62	25
Dodge City, Kans.	0.15	21	0.30	21	0.75	21
Duluth, Minn.	0.15	4, 30	0.20	4, 30	0.50	4
Galveston, Tex.	0.25	7	0.32	7	0.78	7
Jupiter, Fla.	0.40	4	0.75	4	1.75	4
Marquette, Mich.	0.35	3	0.70	3	1.80	3
Memphis, Tenn.	0.01	28	0.04	28	0.20	28
New York City	0.32	26	0.60	26	1.24	2
New Orleans, La.	0.15	10, 22	0.25	22	0.93	22
Norfolk, Va.	0.18	24	0.25	19	0.41	19
Philadelphia, Pa.	0.35	21	0.53	21	1.16	21
Portland, Oregon	0.05	31	0.05	31	0.10	31
Savannah, Ga.	0.20	10	0.30	10	0.70	10
San Diego, Cal.	*		*		*	
San Francisco, Cal.	†		†		†	
Santa Fe, N. Mex.						
Saint Louis, Mo.	0.15	8	0.21	8	0.50	8
Saint Paul, Minn.						
Washington City	0.30	1	0.55	1	0.82	21
Wilmington, N. C.	0.25	22	0.40	22	1.27	22

* Not sufficient to register. † No rain. ‡ Rain-gauge not working. § Rain-gauge failed.

WINDS.

The prevailing winds during August, 1890, are shown on chart II by arrows flying with the wind. In New England, the upper lake region, and on the northeast slope of the Rocky Mountains the winds were mostly from southwest to northwest; in the middle Atlantic states, south to west; in the south Atlantic states, the upper Mississippi valley, and the southern plateau region, southeast to southwest; in the Florida Peninsula, the east Gulf states, and the lower Rio Grande valley, east to southeast; in the west Gulf states, northeast to southeast; in the Ohio valley and Tennessee, south to southwest; in the lower lake region, and on the south Pacific coast, west to northwest; in the Missouri Valley, and on the middle-eastern and southeast slopes of the Rocky Mountains, south to southeast; on the north Pacific coast, north to west; and in the extreme northwest, the northern plateau region, and on the middle Pacific coast, variable.

HIGH WINDS (in miles per hour).

Wind velocities of 50 miles, or more, per hour were reported at regular stations of the Signal Service, as follows: 7th, 56, nw., at Fort Sully, S. Dak. 10th, 60, sw., at Rapid City, S. Dak. 21st, 61, sw., at Mount Killington, Vt. 24th, 58, n., at Valentine, Nebr. 27th, 96, nw., at Mount Washington, N. H.; 74, w., at Green Mountain, Me. 29th, 85, nw., at Mount Washington, N. H.; 54, e., at Winnemucca, Nev. 30th, 50, sw., at Winnemucca, Nev.

LOCAL STORMS.

During the afternoon of the 1st a heavy thunder-storm, with vivid lightning, rain, and hail, passed over Philadelphia, Pa. In the evening severe electric storms occurred on the New Jersey coast. A thunder-storm from the west passed over Cincinnati, Ohio, at 1.20 p. m., with heavy rain, and wind 35 miles per hour from the nw. The high wind lasted but 10 minutes,

and was apparently more violent in Newport, Ky., where several buildings were unroofed or otherwise damaged. A destructive rain storm occurred at Mossing Ford, Va., the evening of the 2d, causing the overflow of small streams, and the destruction of crops on low land. At Copal Grove, N. C., a storm caused damage to fruit and forest trees and injured corn and cotton to the value of about \$500. In the morning a wind, rain, and hail storm caused damage to crops and buildings at Otho, Iowa. On the 3d at 4.20 p. m., eastern time, a thunder-storm, with heavy rain and large hail, began at Sioux City, Iowa. Hail continued about 40 minutes; the stones were irregular in shape, some being 1 inch long and $\frac{3}{4}$ inch thick; the outside of the stones was composed of rough, clear ice and the centre of white, soft ice. About 10.30 a. m., central time, a hail storm from the west passed north of Sibley, Iowa, the southern edge of the path being about $3\frac{1}{2}$ miles north of that place. The width of the path of hail was about 6 miles, the path of greatest destruction being $1\frac{1}{2}$ mile, and the path was known to be at least 75 miles in length, and extended over Lyons, Osceola, Dickinson, Emmet, and Winnebago counties, Iowa. The hail-stones varied in size from $\frac{3}{4}$ inch in diameter to the size of hens' eggs. A number of persons were badly injured by hail, and the damage to trees, crops, and property was estimated at \$150,000. From 10.30 to 11 a. m. a hail storm, moving east, prevailed at Spirit Lake, Iowa. A severe storm swept over the central part of Webster Co., Iowa, in the afternoon, damaging buildings and trees. Destructive hail storms were also reported in southwest Minnesota. At Sioux Falls, S. Dak., a severe hail storm occurred in the morning, lasting about 8 minutes, with wind about 50 miles per hour. Some of the hail-stones were $5\frac{1}{4}$ inches in circumference. Corn and standing grain, potatoes, and garden vegetables were badly injured. Severe electric, wind, and hail storms prevailed in the afternoon in central and east-central Wisconsin. At Port Huron, Mich., a thunder-storm, with heavy rain, began 12.45 p. m., eastern time, and continued until 1.30 a. m., 4th. The wind attained a velocity of 45 miles per hour at 5.13 p. m., 3d. In the city several buildings were struck by lightning, and one person was severely injured, and in the surrounding country crops were damaged. Considerable damage was caused by a heavy rain and wind storm at Hammond, Ind., on the 3d. A severe electric storm was reported in Cattaraugus Co., N. Y. A severe thunder-storm, with heavy rain, occurred at Cortland, N. Y.; streets and buildings were flooded, and some damage was done by lightning. A rain and hail storm in the evening caused great damage in the southern part of Rockingham Co., Va., and 2 persons were reported killed by lightning in Prince George Co., Va.

On the 4th a heavy wind and rain storm was reported in the southern part of Christian Co., Mo. A wind, rain, and hail storm visited Coldwater, Mich., damaging growing crops. At night a cloud-burst in the mountains, in the east part of Mohave Co., Ariz., caused washouts on the railroad. Advices from Tucson, Ariz., dated the 5th, stated that heavy rain had swollen the rivers, that 60 miles of the Santa Fé road between Benson and Nogales, Ariz., was washed out, and that the Santa Cruz River was flooding the valley. At San Bernardino, Cal., heavy rain, preceded by an unusual amount of thunder and lightning, was reported. Great damage was done in the vicinity of Montreal, Quebec, by a wind storm in the evening, and a heavy thunder and hail storm was reported in New Brunswick. On the 6th a heavy hail storm occurred in Adair and Union counties, Iowa. About 4 p. m. the storm clouds were observed northwest of Orient, Adair Co., and passed slowly to the north of that place. About 5 p. m. the clouds moved rapidly to the westward and when north of Orient moved southward, preceded by a heavy wind for a few minutes, when the air became calm. Heavy rain began falling, followed by hail. The storm moved south into Union county, where great damage was caused to crops. About 7 p. m., central time, a hail storm, probably the same storm felt in Adair and Union counties, moved southwest over the north part of Taylor county. On the 7th at 9.30

p. m., a furious wind storm, from the south, prevailed at Marshall, Minn. A wind storm, with thunder and lightning, moved eastward over Saint Paul, Minn., in the evening, and at Montevideo, Minn., a hail storm badly damaged crops. At Riverside, Cal., a barn was struck by lightning and burned. Cochise Co., Ariz., was visited by a heavy rain storm at night; damage was done at Tombstone and Fairbank. On the 8th a severe wind storm set in at 7.55 p. m., eastern time, at Manistee, Mich. For several minutes the wind was 60 miles per hour from the west. 12 to 15 miles north of Manistee standing timber was blown down, and one life was reported lost. A hail and wind storm passed over Wexford Co., Mich., damaging trees and crops. Severe storms were reported in Ashland, Winnebago, and Eau Claire counties, Wis. At Jacksonville, Fla., a thunder-storm prevailed from 7.45 to 11.15 p. m., during which several buildings and trees were struck by lightning.

On the 9th an electric storm visited Weakley Co., Tenn., during which one man was killed and others injured. On the 10th a heavy thunder-storm swept over Long Island Sound along the Conn. coast, attended by high wind, rain, and, in places, hail, causing damage to corn and tobacco crops in south and southeast Conn. A heavy wind, rain, and hail storm passed over Paterson, N. J., causing damage to buildings and trees, and a heavy electric and hail storm visited Long Branch, N. J. At Rapid City, S. Dak., a thunder-storm, with unusually heavy rain, hail, and high wind, began at 6.30 p. m. and ended 8.10 p. m. The wind reached 60 miles per hour, and a great portion of the city was flooded. The total loss to property in and about Rapid City was estimated at \$14,000, and one man was killed by lightning. The northern part of Orange Co., N. Y., was visited by a severe electric, wind, and hail storm about noon, causing great damage to buildings and crops. On the 12th a severe storm was reported at Belmont, W. Va. On the 14th a thunder-storm, with violent northerly wind, and the heaviest hail and rain storm on record at that place, occurred at Colorado Springs, Colo. The storm began 6.15 p. m. and ended 7.25 p. m., eastern time. Hail began 6.35 p. m. and continued 15 minutes, during which time it covered the ground to a depth of 6 inches. Some of the larger hail-stones were $\frac{3}{4}$ inch in diameter; their formation was generally spherical, and they were composed of clear ice; but at times the hail fell as a shower of crushed ice without symmetry of form. The total amount of rain and melted hail was 3.18 inches, of which 2.75 to 3.00 inches fell from 6.20 to 6.50 p. m. Within 3 to 4 minutes after the hail began the temperature fell from 75° to 47°. The track of the storm was from west to east; its width was nearly $1\frac{1}{2}$ mile, and its length about $3\frac{1}{2}$ miles. The great volume of water did considerable damage to railroad tracks, bridges, etc., and traffic was temporarily suspended. In the city cellars were flooded in the southern portion, and lightly constructed buildings were swept away. The damage was estimated at \$8,000 to \$10,000. The night of the 16th a severe electric storm occurred at Carrollton, Mo. Several barns were struck by lightning, 2 of which were burned, and some stock was killed. On the 17th a heavy thunder-storm prevailed at Gratiot, Ohio, from 12.40 to 1 p. m., during which a barn $2\frac{1}{2}$ miles south of that place was struck by lightning and burned. The night of the 20th a storm which demolished houses, uprooted trees, and killed stock was reported in Mason Co., Tex.

The evening of the 21st a severe thunder-storm passed over Baltimore, Md.; 1.96 inch of rain fell from 6.05 to 7.15 p. m. Cellars and, in places, the first floors of houses were flooded in the lower portion of the city, and trains on the Baltimore and Potomac Railroad were delayed by washouts. The storm was also very severe in Washington Co., Md., where small hail fell, and where the damage was estimated at \$14,000 to \$15,000. At Philadelphia, Pa., a moderate thunder-storm, with high wind and excessive rain, occurred in the evening. The wind attained a velocity of 40 miles per hour at 7 p. m.; 1.00 inch of rain fell in 25 minutes and 0.35 inch in 5 minutes. During the storm the roof of a car stable, an improperly constructed building, fell in, killing 5 people and injuring 7; 3 horses were

killed and several cars wrecked; damage about \$10,000. A light hail storm passed southeast over Altoona, Pa., at 3 p. m., eastern time, demolishing one stable. A severe wind and thunder-storm moved northeast near Sheridan, Pa., at 5 p. m., eastern time, destroying 5 buildings. A severe thunder-storm passed over Fryburg, Pa., at 1 p. m., local time, damaging buildings. A heavy rain and wind storm passed over Cortland, N. Y., in the afternoon, causing great damage to buildings and trees. At Hiram, Ohio, a violent rain storm, with high wind and lightning, occurred at 9.30 a. m. The storm moved from the southwest, and about 6 miles northeast from Hiram destroyed a house and barn. The track of the storm was about 300 feet wide. There was unmistakable evidence that the storm had a rotary, contra-clockwise motion. Trees thrown down in the left half of the track nearly all lay with their tops toward the right or toward the centre of the track. On the 26th violent local storms caused damage in Ky., northern Tenn., W. Va., and western Pa.; and near McConnellsville, Ohio, very heavy rain fell in the afternoon, flooding small streams and causing great damage to crops, roads, and bridges. On the 27th heavy rain fell in the lower Mississippi valley, and severe gales prevailed on the Gulf coast. On the 28th a severe thunder, rain, and hail storm was reported at Coldwater, Mich., causing damage to buildings and orchards. On the 29th a wind storm passed northward over Payette, Idaho, unroofing buildings and destroying a bridge.

WILKES BARRE TORNADO OF AUGUST 19, 1890.

As already noted this tornado occurred during the passage of Low VI. At 8 p. m. of the 19th a trough of low pressure extended from western Pa. to northern Vt. It had very slight intensity; the lowest isobar (that of 30.00) extended in an oval form 600 miles from ne. to sw. and 300 miles in the other direction. The lowest pressure was 29.92, and the gradient between 30.00 and 30.10 isobars was not far from 1 mm. in 69 miles. The wind velocity for that gradient is 4 miles per hour, and the winds were remarkably low throughout this region. The velocity of this Low from 8 a. m. to 8 p. m. was 47 miles per hour. The following table shows the direction of clouds, and at mountain stations of the wind, at 8 p. m.:

Station.	From—	Station.	From—	Station.	From—
Albany, N. Y.	se.	Mt. Washington, N. H.	s.	Cincinnati, Ohio.	w.
Buffalo, N. Y.	sw.	New York City.	se.	Cleveland, Ohio.	w.
Erie, Pa.	sw.	Philadelphia, Pa.	sw.	Columbus, Ohio.	w.
Green Mountain, Me.	se.	Rochester, N. Y.	e.	Harrisburg, Pa.	w.
Killington, Vt.	sw.			Northfield, Vt.	n.

These stations have been placed in two groups, the first two columns showing direction of clouds from sw. to e., and the third column from a westerly or northerly quarter. It will be seen that the first group lies to the south and east of Wilkes Barre, while the other, with the exception of Harrisburg and Northfield, to the west.

The exact time of the tornado it has been found impossible to learn, the earliest is 5 p. m. and the latest 5.36; the latter was by an engineer who saw the cloud from a point 12 miles distant. It seems probable that the time was not far from 5.32 p. m. in the centre of the city. Just before and after this time on this afternoon the following paths of storms and high winds, with lightning and thunder in most cases, were reported. There were, in all, eight distinct paths traced; the general course in all was toward a point a little north of east. All towns are in Pa. unless otherwise mentioned.

(A) Wellsborough, thunder-storm at about 2.00 p. m.

(B) Brushville, about 6 p. m.; Summerville, 5; New Milford, 5.30, one boy killed.

(C) Philipsburgh, stormy all day; State College, 2.12; Nisbet, afternoon; Rohrsburgh, Stillwater, Fishing Creek, Central, 4.15 p. m.; Benton, some destruction; Bloomingdale, 3 killed, either in town or near by; Register, one fatally injured; Harveyville, 5 p. m., great damage, one killed; Silkworth, 3 killed. Probable loss in these towns, near Harveyville, \$60,000. Muhlenburgh, Dyberry, thunder-storm p. m.

(D) Blue Knob, thunder-storm p. m.; Bloomsburgh, about 5.10; Shick-shinny, a girl killed; Wilkes Barre, 5.17 p. m., 16 killed, loss \$600,000; Scranton, about 6 p. m.; Kingston, Salem Corners, about 6 p. m.; Blooming Grove, thunder-storm about 7 p. m.

(E) Hazelton, some damage; White Haven.

(F) Sinking Spring, 8 p. m., one killed; Reading, about 8 p. m., one killed; Katztown, some damage, loss about \$5,000; Easton, about 9 p. m.; Greenwich, N. J.

(G) Gettysburgh, thunder-storm about 8 p. m.; Harney, Md., valuable bridge destroyed; Little Britain, some damage; Christiana, Md.; Phoenixville, 7.40 p. m., ball of fire, 4 inches diameter.

(H) Elkton, Md.; Shiloh, N. J.; Bridgeton, N. J., about midnight 19th; Union Grove, N. J.

It is much to be regretted that the times here given are so uncertain, but in general there is an agreement in the times which shows that violent winds began early in the afternoon in the northern part of Pa., and the paths gradually appear at points farther toward the southeast, the general direction of progression of the violent wind being toward the ene. It has been found almost impossible to sift out conflicting reports and to obtain an accurate list of persons who lost their lives. For example, Mrs. Luther Wilkinson is reported as killed in no less than four separate towns; Lizzie Burns is reported from one town and Mamie Burns from another. By making a careful list of names it is believed that every person killed has been ascertained, though in the case of two, where no names were given, it may be that only one was killed. The total loss of life in all the towns was 27 or 28. The loss of property cannot be accurately stated, but it was probably under \$680,000. The following special reports are given, from Judge Rhone, who has interested himself very much in the tornado investigation, from Professor Santee, and from Mr. G. E. Curtis. Others have also contributed valuable reports. Mr. E. Groux, an instrument maker, was reading a barometer at the moment the tornado passed within 300 feet. He reports that the mercury rose .05 inch and recovered almost instantly.

Judge D. L. Rhone reports: "A bank of clouds lay along the north side of the track of the storm, about forty miles in length as seen from this valley, which extends from Milton to Wilkes Barre. The indications, for an hour or so, were those of the approach of an ordinary thunder-storm from the north-western lakes. The sun was shining on top of this wall of clouds, giving it a reddish or brazen tint. The thermometer stood at about 80°. The wind from the southwest was carrying dark cloudlets into the great cloud-bank at about twenty miles an hour. The track of the cyclone lay beneath the southerly border of this cloud-bank, preceded by frequent intense discharges of electricity. The core of the whirlwind appeared in form like a funnel with its broad top lost in the general cloud-bank, and in color it resembled a great conflagration—that is, a column of dense smoke and flying embers. The distinct apex or nozzle was black. This column moved slightly north of east at the rate of about sixty miles an hour and its nozzle had four distinct motions—(1) on its own axis like a spinning top, (2) forward, (3) a horizontal zig-zag, that is, waving in somewhat angular lines north and south of its forward course, and (4) rising and falling at short intervals. The inverted cone held its main course without reference to the deep ravines and high hills which lay across its path or the amount of resistance met, but the apex or nozzle selected such depressions and ravines as ran closely to and nearly in line with the main line. Its gyration was from left to right when viewed from behind and in its forward course it swirled most of the uprooted tree tops and timbers after it so that everything was carried or was leaning easterly as well as inwardly toward a common centre. As the nozzle rose it sucked up buildings and crushed them inward, but as it fell it crushed buildings and tree tops downward and outward. Much of the time the apex rode from ten to twenty feet above the ground, showing the brazen clouds beneath, hence much of the damage was in the roofs of buildings and their upper stories. The huge funnel at times broke into smaller ones, and each small one bored, twisted, and ploughed away in small spots and patches. The length of the dangling apex or nozzle at no time exceeded perhaps five hundred feet, and none of the objects of any considerable weight were carried more than a few hundred feet in any direction. Light articles, however, were carried four to five miles. There was but little electricity or rain in connection with the gyrating core, but quite a downpour of rain followed in its track. The track of desolation for most of the distance through the country was less than five hundred feet wide. Where the track was narrowest the destruction was most complete."

He also makes the following second report: "My statement, published in the 'Record,' that the core of the cyclone whirled from left to right on its axis is questioned by eminent meteorologists, and after a more thorough investigation I am satisfied that my statement is not correct. There are, in small patches, evidence of a twirling motion either from left to right or from right to left as one may assume the fact to be, but these evidences are deceptive and only exist to the leeward of forests, on the west side of deep ravines, in blocks of cities or other places where counter currents and eddies were formed. For miles and miles through the open country trees, debris of buildings, fences, corn, and objects of every nature lie eastward and inward toward a common centre. That is, objects south of the centre of the track lie north to northeast and east, those north of this centre lie south to southeast and east, the centre objects lying directly east in something like windrows. By the compass in Huntington Valley, where most of my observations were made, for at least twenty miles the main course of the storm was from 10° to 17° north of east. Plenty of trees are found twisted on the stump both northward to eastward and southward to eastward, but it seems in all such cases the tree previously leaned either northward or southward of its stump. None of the uprooted trees were swung around on the ground during or after their fall, save that some few in the centre of the track were dragged eastward after they had fallen, and in one place (Kline's) apple trees were piled up on each other in the centre of track. In swamps trees lie in all directions, but they were lightly set on a hard-pan soil and fell under various degrees of pressure in the direction of their former inclination or were knocked or dragged down or off by others falling upon them. Straw, hay, clothing, and other objects caught up by the storm were dropped down in or near the direction of the storm and not at any great tangent to it. I nowhere see any evidence of a centrifugal force except of the nature of an eddy or such as occurs in autumn when leaves

and thistle-down are caught up and float away, or such twists in trees as before stated. There was not found any piling up of objects except at the centre of the track or immediately around demolished buildings.

"In at least two places where buildings were demolished beehives and flower pots stood undisturbed only some fifty feet away. Along the north and south sides of the track trees lay almost at right angles to the storm, leaning more and more eastwardly toward the centre. At Cambra a field of oats in sheaf was driven into the woods near by with no evidence of having been whirled there. The field was somewhat north of the centre and the sheaves were drifted somewhat south as well as east in line with fallen trees. At Chapin's place, near Harveyville, the centre of the track seems to have been between the house and barn. The north side of the barn roof and the south side of the house roof there were carried off easterly over the garden. The debris of one of the smaller barns there lies northwesterly from the foundation, although the building was south of the centre. Some roofs fell in on the foundation. Bonham's house was pushed northeasterly. Smith's house, further north, one-half mile west of Bonham's, was carried southeasterly. The west end of Harvey's mill, near centre of track, was swung southerly six inches, while the debris of his barn, south of the centre, was carried northwesterly, and a large walnut tree lies north seventy degrees west. Between these buildings apple trees lie with their tops together. Patches of Gregory's sheet-iron barn roof, about one mile east of Harveyville, were driven one thousand feet or more easterly in line of storm. A narrow strip of trees in woods east of Harvey's, on northern edge of track, lie directly west, as also at Hughes', near Cambra, but at other points on extreme southerly edge of the storm the same counter current may be seen as at Cline's and Chapin's. So the evidences multiply on every hand that but one general line of force existed, to wit, inwardly toward the centre of the track and easterly.

"I find the same general drift in Wilkes Barre, but the local eddies and counter currents are more numerous than in the country. Here Judge Dana's office, the pottery, Kittle's smoke stack, Hazard Works, Catholic Church steeple, Robbin's mill, Brown's Block, Lee's planing mill, all in or near centre of track, and all small chimneys, as also ten thousand other things outside of centre of track, drifted directly with the storm to one that eddied out of the main course, as before indicated."

Prof. Santee says: "Perhaps the most striking peculiarity of the track of the storm of August 19th is the waving line which it marks out with points of regularity as it passes across the face of a section entirely irregular in its surface. Everyone is familiar with such phrases as 'The storm followed the river,' 'A storm passed along the side of the mountain,' and kindred expressions. Now this storm, as shown by its track, moved entirely independent of any of the usually recognized local controlling causes, as will be seen by an examination of the line through our valley, the accuracy of which may easily be verified by any person interested.

"Beginning about two miles southwest of Nanticoke its course was about north 60° east to the eastern end of Nanticoke bridge, then curving southward the course is south 85° east about half-way to Butzbach's Landing, then turning northward to a parallel with the first part of course north 60° east it reaches Butzbach's Landing, nearing again to a parallel with the second part of the course south 85° east it crosses near the cemetery at Hanover Green through about a mile of woodland, crossing the corner of the cemetery lot at the cross roads on the middle road below Wilkes Barre through Sively's woods across the Downing rifle range to the southern part of Petty's woods where it makes another turn to the northward, a general course to Five Points north 60° east.

"From Five Points to Mountain Park the course is again south 85° east. There are shorter turns in the course, but they are not probably due to a turn in the general course of the storm. This feature is true in the Huntington Valley tornado as well as that which passed through our valley. The vibration to north and south being regular throughout its course.

"Another noticeable characteristic is the tendency to divide generally into two main lines of damage, especially where the tornado seemed to rise from the earth or where it was descending and before it reached its closest sweep to the ground. These lines again would subdivide, each seeming to have almost the characteristic of a smaller tornado. Thus in Sively's woods, at the west of Downing's rifle range, there are three or four distinct lines of broken timber with intervening spaces left almost untouched, and so, perhaps few have failed to notice in our city, are lines of wreck, and but little damage between. At Ross Street, the southern end of the Hazard Rope Works was crushed by the southern line, while the northern line of the storm was higher in the air at S. Y. Kittle's place. At Market Street the southern line struck Stegmaier's brewery, while the northern line took the top portion of Brown's block. These lines are much more readily traced in the forests because they show more regularly the entire effect of the wind than do buildings which differ so greatly in height and strength.

"Another curious trait is the severity of the storm in deep and narrow valleys. Among the severest points of the storm are the crossing at Fishing Creek, where it struck and nearly destroyed the fine buildings belonging to Hilbert Hulme, Harveyville; where it crossed Huntington Creek at Mallory Wolfe's place, which is between hills on low ground; at the point where it crossed Hunlock's Creek and destroyed the heaviest body of timber on the track; also at the east of the ridge on which the Hillard Grove school stands, and at the east of Elbow Mountain, on John P. Lawler's farm. Each of these points is protected by a high and steep hill at the west from all ordinary west winds, but each is a point of special damage by this storm. While this belt of debris, ranging from fifty to a thousand yards in width, with its divisions

and side currents, indicated by the direction in which various articles are carried, offers a very complex and often contradictory field for study, yet I think there is that which may be reduced to some order. If the track of the storm at any given point be divided into four equal bands running with the track, then the northern and the southern portions would be similar, each consisting of broken trees, lying forward and inward toward the severer central parts of the storm. Of the two central fourths of the storm-track the southern line would consist of debris scattered forward almost directly in the course of the storm, while the northern line would be made up of wrecks lying to every point of the compass, as though the wind had come from every direction. While many exceptions would occur, these conditions would generally be found. Many heavy articles would be found carried to the east, northeast, north, and northwest, while but few would be found carried to the south or southeast. Hundreds of trees lie with their tops to the west and nearly all are in the northern belt of the severe part or main track of the storm. No trees on the southern side of the storm were turned to the west, as far as I have seen.

"During the first few miles of each tornado it is described as white or transparent. The Huntington tornado was a white cloud from the ridge west of Little Green Creek to Frank Bellas' place, where it suddenly became intensely black. The Wyoming tornado passed through nearly the same phase as it crossed Hanover, becoming intensely black as it struck South Wilkes Barre.

"In each case after the storm became black, fire was noticed in the storm by a number of witnesses, whose testimony could hardly be questioned. Taking the various descriptions which I received, the fire in the dark cloud is a prominent characteristic.

"From Fishing Creek to Pine Creek the odor of the air surrounding the storm was very strong and accounts of it agree with the accounts of the smell of ozone and antozone which are produced by lightning strokes, or by a powerful current of electricity passing through oxygen gas. In a portion of its course the storm is described as having a hum like the hum of a rapidly-revolving cylinder.

"While in most of the course there was little or no rainfall with the tornado, yet at Roland Wilkinson's place the people were drenched with a sudden sheet of rain which was in the storm.

"The crushing of trees and buildings downward in places indicates points of great pressure, while the bursting of a closed room near Harveyville seems a plain proof of vacuum or an approach to it.

"Window glass punctured as by a gunshot indicate a speed of the current able to project small bodies at a velocity to produce such results and there are too many such instances to explain upon any other supposition. On the other hand there are many instances of animals, buildings, and persons and various articles lifted and let down again without clear evidence of being touched by any severe wind. A barn with horses in it was lifted over a fence and the horses unhurt. Cattle were carried about without serious harm, as has before occurred in western tornadoes, and in one place a jar of fruit was carried a long distance and only the porcelain lining of the cover broken.

"Many trees along the storm line are withered as by fire, and some are entirely dead though but little broken.

"At one point articles of clothing which were bleaching on the grass were covered with spots which appeared as if scorched by a hot iron."

Mr. G. E. Curtis reports: "The City of Wilkes Barre, Pa., was visited by a tornado at 5 p. m. on August 19, 1890. For the half hour previous to the advent of the tornado an intense thunder-storm seemed to be approaching from the southwest, and vivid lightning flashes marked its gathering fury. On reaching the city the storm apparently increased in energy, the lower clouds began scudding in great circles at tremendous speed, and a sudden gust of wind sprang up, blowing towards the oncoming mass of black cloud. With an increasing roar and darkness, the concentrated storm swept northeastward through the entire length of the city, carrying death and destruction in its path. Sixteen persons were killed outright or soon died from injuries received, and additional deaths were reported as indirectly occasioned thereby at a later date. No carefully conducted estimate of destruction has been made, but \$500,000 is considered to be a moderate estimate of the losses directly sustained by property owners in the tornado path. On September 2d the present writer visited Wilkes Barre to find what could still be learned as to the character of the storm by examining the distribution of the debris and by obtaining the statements of careful observers. And I desire here to acknowledge the kindly assistance rendered by Judge D. L. Rhone, and by the editors of the Wilkes Barre 'Record,' who personally conducted me over large portions of the tornado track, and pointed out many of the salient features still to be witnessed as evidences of the power of the storm.

"The first striking peculiarity observed was the sporadic character of the destruction. The idea of a narrow path within which everything is levelled to the ground, or practically destroyed, had no realization in this tornado. The track can indeed be defined by the destruction that it wrought, but it is of irregular width, and throughout its whole length in the city it exhibits unaccountable alternations of destruction and preservation. The tornado was as lawless and freaky in its behavior as it is mysterious in the development of its power; and after the latter shall have been satisfactorily accounted for, the former will still continue to puzzle and astonish both the ignorant and the learned. In the centre of destruction the tornado was a respecter neither of persons nor of well-constructed brick and mortar, but selected at random the victims of its power. Sometimes strong brick structures were badly wrecked, while weak frame buildings beside them were left untouched. This, however, only in what may be termed the centre of destruction. On the borders of the track damage consisted largely in unroofing, and here well-built houses with firmly-secured roofs, very generally escaped injury.

"With respect to the direction in which trees were blown down, roofs carried away, and debris scattered no complete uniformity exists. Material, especially in the centre of destruction, can be found carried in every direction, but, taking the path of destruction as a whole, the generalization adopted by Prof. H. A. Hazen, that from both borders of the track trees and debris are blown forward and inward toward the centre, seems to be quite well sustained. That such is the case is also confirmed by Judge Rhone after examining the track of the tornado both in Wilkes Barre and for many miles through the forest southwest of that city. A similar observation has been related to me by an observer of the tornado tracks in the forests of Arkansas. It appears, therefore, that, in general, a surface current of destructive force blows from either side inward to feed the vortex of the storm. Many persons described the motion of the tornado cloud as like that of a huge balloon, careening from side to side in its progress, at one time swooping down to the ground, and then floating for a time entirely above it. This conception of the actual behavior of the tornado cloud enables us to understand in some degree the extraordinary freaks in the destruction. The pendant apex of the cloud, like the ear of a balloon, swishes into the side of a house here, lashes the corner of a roof there, curls around a church steeple or factory chimney yonder, and farther on swirls up a whole mass of timber into its centre, whirling them in its grasp, and dropping them hundreds of feet away. In addition to these general characteristics, some individual phenomena deserve to be specially mentioned. An interesting feature, observed in a considerable number of cases, was that the roof of a house was blown off and the entire leeward side was torn outward with it, leaving the interior of the house wholly exposed.

"In at least one case, however, I found a house, a portion of whose leeward side was blown out on the first floor, while the roof remained intact. This seemed like an actual case of bursting, and could not be explained like the others, as having been dragged outward by the attached roof. I heard also of other houses in which the side blew out, while the roof remained unharmed. A case of equally great interest was a row of light frame tenement houses situated in a depression on the east side of the Lehigh Valley Railroad track near the Pennsylvania Railroad round-house. The houses, each 16 feet in width, were placed five feet apart, and faced about east by south. The path of destruction at this point is of unusual width, and changes from a northeasterly to a more easterly direction. Consequently it is difficult to locate the centre of the path of greatest destruction, or to construct any simple idea of the tornado's behavior. The railroad embankment, 20 feet high, divides the path into two parts, and it is not irrational to suppose that the tornado cloud may likewise have divided itself into two tongues. But, in any case, the phenomenon is this: the house on the south side of the row was

lifted from its foundation and dropped three feet forward and five feet to the left, close up against the middle house. The house on the north side was taken up and set down about three feet backward, and close up against the middle house. The middle house was lifted up and dropped back again in its place without much displacement but with considerable injury—its lower portion being battered in, as if it had been dropped from a greater height than the others. A photograph in my possession illustrates these details.

"Of many other phenomena I will mention only one more. A large smoke stack with an attached piece of casing, the whole mass weighing not less than 400 and perhaps 500 pounds, lies in a yard on the northwestern edge of the tornado track, having been carried fully 500 feet north from a mill in the centre of the track. The mass seems therefore to have been whirled up to an unknown height by a vertical uplift, and then carried by a current of enormous force to the northward until its inertia carried it out of the tornado cloud, after which it reached the ground under the action of gravity and its acquired velocity."

WATER-SPOUTS.

On the 20th, between 3.45 and 4 p. m., 4 water-spouts were observed about 4½ miles nnw. from Key West, Fla. 3 of the spouts were well-defined though of small diameter. The water at their base was churned into a mist which extended to a height of about 20 feet. The fourth spout, which developed at 3.50 p. m., extended downward but a short distance from the clouds, although its influence extended to the water, as shown by the mist raised. Each of the formations lasted 5 minutes. The cloud under which the spouts formed was cumulo-stratus in formation, and the spouts developed between 2 rain squalls. On the 30th, at 6.15 p. m., 3 well-defined water-spouts were observed in the Gulf about 2 miles off Galveston Island. The cloud with which the largest spout was connected had the characteristics of a tornado cloud; no rain fell from it, and the sky was clear to the north and south. This cloud connected with 2 others, one to the west and the other to the east, from both of which rain was apparently falling. The other 2 spouts were located between the observer and the rain cloud on the east of the large spout; they were well defined and connected with the water below.

INLAND NAVIGATION.

STAGE OF WATER IN RIVERS AND HARBORS.

The following table shows the danger-point at the several stations; the highest and lowest water during August, 1890, with the dates of occurrence and the monthly ranges:

Heights of rivers above low-water mark, August, 1890 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River.</i>						
Shreveport, La.	29.9	31	2.5	23-24	—0.2	2.7
<i>Arkansas River.</i>						
Fort Smith, Ark.	22.0	30	11.5	12 to 15	0.0	11.5
Little Rock, Ark.	23.0	24	10.1	18	3.2	6.9
<i>Missouri River.</i>						
Fort Buford, N. Dak.		1	6.0	31	2.6	3.4
Sioux City, Iowa		1	8.9	31	6.0	2.9
Omaha, Nebr.	18.0	1	9.1	31	7.3	1.8
Kansas City, Mo.	21.0	1	9.5	31	6.3	3.2
<i>Mississippi River.</i>						
Saint Paul, Minn.	14.5	1	2.4	11, 18	1.3	1.1
La Crosse, Wis.	13.0	1, 2	4.3	12	3.2	1.1
Dubuque, Iowa	16.0	4	4.8	16	3.0	1.8
Davenport, Iowa	15.0	1	3.9	17	1.7	1.3
Keokuk, Iowa	14.0	1	3.2	18, 19	1.6	1.6
Saint Louis, Mo.	32.0	1	10.7	22	7.8	2.9
Cairo, Ill.	40.0	1	12.8	10, 25, 26	9.0	3.8
Memphis, Tenn.	34.6	1	11.1	26, 27	8.1	3.0
Vicksburg, Miss.	41.0	1	12.8	17 to 24	9.0	3.8
New Orleans, La.	13.0	27	5.0	31	3.6	1.4
<i>Ohio River.</i>						
Pittsburgh, Pa.	22.0	27	8.8	31	3.9	4.9
Parkersburg, W. Va.	38.0	28	13.2	5	2.7	10.5
Cincinnati, Ohio	50.0	30	20.8	4, 5	5.8	15.0
Louisville, Ky.	25.0	31	9.1	6	3.7	5.4
<i>Cumberland River.</i>						
Nashville, Tenn.	40.0	12	12.2	5, 22	2.7	9.5

Heights of rivers—Continued.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Tennessee River.</i>						
Chattanooga, Tenn.	33.0	10	7.5	22	2.5	5.0
<i>Monongahela River.</i>						
Pittsburgh, Pa.	29.0	27	8.8	31	3.9	4.9
<i>Savannah River.</i>						
Augusta, Ga.	32.0	30	12.8	27, 28	5.7	7.1
<i>Willamette River.</i>						
Portland, Oregon.	15.0	1, 2, 3	7.1	25	3.2	3.9

LOW WATER.

Arkansas River.—At Fort Smith, Ark., the river fell to zero on the gauge on the 12th. This is the lowest stage of water on record at this point since 1856. At Wichita, Kans., the river, which had been dry for weeks, began rising the night of the 25th. The river began to fall again on the 30th.

FLOODS.

At Eagle Pass, Ariz., the Gila River was high and impassable ¼ of the month. Ditches were much damaged, and freight-impeded or stopped.

HIGH TIDES.

Unusually high tide occurred at Key West, Fla., 1st, 2d, and 28th to 31st, and the tide was very high in Pensacola Bay, 26th, 27th, and 28th.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroras were reported as follows: 2d, Farmington, Minn. 3d, Ilion, N. Y. 6th, Carson, Iowa. 10th, Hanover, N. H. 14th, Saint Andrews, N. B.; Orono, Me.; Amherst and Newburyport, Mass.; Berlin Mills, N. H.; and Grantsburgh and Madison, N. H. 14-15th, Green Mountain, Me. 15th, Bar Harbor and Orono, Me.; and Newburyport, Mass. 16th, Kent's Hill, Me.; Pine River Dam, Minn.; and Webster, S. Dak. 17-18th, Sault de Ste. Marie, Mich. 18th, Green Mountain, Me.; Amherst, Mass.; Saint Vincent, Minn.; Hanover, N. H.; and Webster, S. Dak. 19th, Sault de Ste. Marie, Mich.; Huron and Webster, S. Dak. 19-20th, Saint Vincent, Minn. 20th, Alta, Iowa; and Farmington, Minn. 24th, Webster, S. Dak. Saint Andrews, N. B., 14th: an auroral light of a curtain-like formation was observed from 8.30 to 9.30 p. m.

Green Mountain, Me., 14-15th: a faint aurora consisting of a well-defined arch of white light was observed from 8 p. m., 14th, until morning of 15th. The arch rose to altitude 8°, and extended from azimuth 150° to 215°, with maximum brilliancy about 10 p. m. A similar display both as to time and character was observed on the 18th.

Sault de Ste. Marie, Mich., 17-18th: an aurora consisting of an arch of pale orange color extending from azimuth 175° to 225°, from which beams of light shot up to about altitude 25°, was observed at 9.15 p. m., 17th. The display disappeared about 2.20 a. m., 18th. On the 19th an aurora consisting of a white light which rose to about altitude 20° was observed at 9.45 p. m. The maximum brilliancy of this display occurred about 11.35 p. m., at which time it extended from nw. to ne. At 11.50 p. m. the aurora had disappeared.

Saint Vincent, Minn., 19-20th: an auroral display was ob-

served from 10.10 p. m., 19th, to 1.40 a. m., 20th, consisting of 8 well-defined streamers. The aurora extended from azimuth about 175° to 210° and varied from deep red to pale straw in color. Two streamers located in the centre of the display attained altitude about 60°.

THUNDER-STORMS.

The more severe thunder-storms of the month are described under "Local storms." East of the Rocky Mountains thunder-storms were reported in the greatest number of states, 30, on the 1st, 4th, and 19th; in 20 to 29 on the 2d, 3d, 5th to 10th, 17th, 20th, 21st, and 26th; in 10 to 19 on the 11th to 16th, 18th, 22d, 24th, 25th, and 27th to 30th; and in 5 to 9 on the 23d and 31st.

East of the Rocky Mountains thunder-storms were reported on the greatest number of dates, 30, in Fla.; on 20 to 28 in Ill., Iowa, Kans., La., Mo., Nebr., N. Y., S. Dak., Tenn., and Tex.; on 10 to 19 in Ala., Ark., Conn., Ga., Ind., Ky., Md., Mass., Mich., Minn., Miss., Mont., N. H., N. J., N. C., N. Dak., Ohio, Pa., S. C., Vt., Va., and Wis.; and on 1 to 9 in D. C., Ind. T., Me., R. I., and W. Va. West of the Rocky Mountains thunder-storms were reported as follows: Ariz., 1st to 31st; Colo., 1st, 4th, 5th, 8th to 20th, 22d, 24th, and 27th; Cal., 5th to 9th, 12th, 13th, 14th, 17th, 21st, and 26th to 29th; Idaho, 8th, 9th, 10th, 13th, 17th, 18th, 20th, 23d to 27th, and 30th; Nev., 5th to 14th, 21st, 22d, 24th, and 27th to 31st; N. Mex., 1st, 2d, 4th, 13th, 15th to 23d, 25th to 28th, and 31st; Oregon, 13th, 14th, 28th, 30th, and 31st; Utah, 8th to 15th, 17th, 18th, 19th, 21st, 22d, 24th, 27th, 29th, 30th, and 31st; Wash., 10th, 18th, 20th, 21st, 29th, 30th, and 31st; Wyo., 2d, 3d, 4th, 9th to 13th, 15th, 16th, 18th, 19th, 21st to 26th, 28th, and 30th. There were no states and territories in which thunder-storms were not reported.

MISCELLANEOUS PHENOMENA.

SUN SPOTS.

Haverford College Observatory, Pa., (observed by Prof. F. P. Leavenworth):

Date.	Number of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		Faculae.	Remarks.
	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.		
Aug., 1890.										
1, 12 m.	0	11	0	0	0	0	3	22	2	Definition poor; 1 large spot.
2, 5 p. m.	1	1	1	1	0	0	1	4	2	1 large spot.
3, 5 p. m.	0	0	0	0	0	0	1	2	0	Definition bad.
4, 5 p. m.	0	3	0	0	0	0	1	5	1	Definition fine; 1 large spot.
5, 5 p. m.	1	2	0	0	0	0	2	9	1	Definition poor; size medium.
6, 5 p. m.	0	0	0	0	0	0	2	14	1	Definition good.
7, 4 p. m.	0	0	0	0	0	0	2	3	1	
9, 5 p. m.	0	0	0	0	0	0	0	0	1	Definition good.
11, 9 a. m.	1	2	0	0	0	0	1	2	1	Definition fair; size medium.
13, 5 p. m.	0	0	0	0	0	0	0	0	1	Definition fair.
14, 3 p. m.	1	2	0	0	0	0	1	2	1	Definition fair; spots small.
15, 4 p. m.	0	0	0	0	0	0	0	0	0	Definition good.
16, 11 a. m.	1	3	0	0	0	0	1	3	0	Definition poor; spots small.
17, 11 a. m.	0	0	0	0	0	0	0	0	0	Definition good.
18, 3 p. m.	0	0	0	0	0	0	0	0	0	Definition poor.
19, 12 m.	0	0	0	0	0	0	0	0	1	Definition good.
20, 6 p. m.	0	0	0	0	0	0	0	0	0	Definition fair.
22, 5 p. m.	2	3	0	0	0	0	2	20	1	Definition good; spots small.
24, 4 p. m.	1	5	0	0	0	0	2	3	1	Definition fair; near edge of sun.
25, 3 p. m.	0	14	0	0	0	0	1	21	1	Definition good; 1 large spot.
26, 11 a. m.	0	10	0	0	0	0	1	24	1	Definition poor; large spots.
27, 3 p. m.	0	44	0	0	0	0	2	78	2	Definition good; 1 very large spot.
28, 3 p. m.	0	26	0	0	0	0	2	35	1	Definition good; 2 very large spots.
29, 3 p. m.	0	0	1	2	0	0	1	60	0	Definition fair; 2 very large spots.
30, 3 p. m.	0	10	0	0	0	0	1	104	0	Definition good; 2 very large spots.
31, 5 p. m.	1	1	0	0	0	0	2	88	0	Definition fair; 2 very large spots.

Mr. C. E. Buzzell, Leaf River, Ill.: the group of July 28th

completed the transit, disappearing in faculae 7th. August 2d prominent faculae on east limb, which broke out in small spots 5th and subsided 8th. Poor definition and apparently clear disc until 25th, when 2 large groups appeared by rotation, and were on the meridian 31st. September 1st unchanged. These groups occupied the same position as the July 28th disturbance, which, however, had about subsided before passing the western limb.

Mr. John W. James, Riley, Ill.: 2d, spot of July 25th vanished before reaching western edge. 3d, a large spot, estimated 24,200 miles in diameter, was on sun's meridian. 5th, spot breaking up, and gone 8th. 9th to 25th, observations on 14 days, but no spots seen. 26th, a fine group near eastern edge; this group was estimated 94,000 miles long, and had a large spot at each end, 34,200 and 27,400 miles in diameter; each spot was surrounded by numerous small spots, and they were connected by a string of small spots. This group was the finest and sharpest in definition of any seen for years.

Mr. D. E. Hadden, Alta, Iowa: one large spot in north latitude near meridian, 1st. One spot, ne., 2d to 5th. One group and 4 small spots, new, se., 6th. One group and 2 small spots visible, se., 7th. Clear disc and no spots, 8th to 11th, 13th to 19th, 21st and 22d. 23d cloudy. One group and 2 small spots, new, visible 24th. 25th cloudy. One group and 4 spots, new, on 26th; brilliant faculae near limb, ne.; group on w. limb surrounded by faculae. 27th, one group, 8 spots, 1 large spot and others small; faint spot, ne., surrounded by faculae. 28th, 5 spots, new.; one group, 13 spots; one large spot, 3 smaller, others very faint, 3 days in on sw. limb. 29th and 30th, one group, 9 spots; appearance about the same as 28th, but larger spots, separated more.

Mr. H. D. Govey, North Lewisburgh, Ohio: sun spots were observed 2d, 4th, 6th, and 27th to 31st.

DROUGHT.

In Kans., Nebr., S. Dak., Iowa, north Tex., Ind. T., Ky., Ill., and south Mich. the drought was broken by rain during the early part of the month, and in Ohio the rains of the middle of the month ended the dry spell in that region. In S. Dak. late crops were reported injured. In southwest Minn. the drought was very severe and streams were reported very low. In Ohio great injury was caused to corn, potatoes, and fruit. In

southern Mich. potatoes, fruit, and berries were affected. In east and central Va. the month was unusually dry, and corn and vegetation were damaged.

PRAIRIE FIRES.

Prairie fires caused considerable damage in parts of Mont. and S. Dak., in Ford and Edwards counties, Kans., and in McCulloch Co., Tex.

VERIFICATIONS.

FORECASTS FOR 24 HOURS IN ADVANCE.

[Verifications made by Assistant Professor C. F. Marvin, assisted by Mr. H. E. Williams, chief clerk of the Forecast Division.]

The forecasts for districts east of the Rocky Mountains for August, 1890, were made by Captain H. H. C. Dunwoody, 4th Artillery, Signal Officer, and those for the Pacific coast districts were made at San Francisco, Cal., by 2d Lieutenant John P. Finley, Signal Corps.

Percentages of forecasts verified, August, 1890.

States.		States.	
Maine.....	80.1	Kentucky.....	83.6
New Hampshire.....	82.7	Ohio.....	86.5
Vermont.....	82.8	West Virginia.....	78.4
Massachusetts.....	83.8	Indiana.....	84.9
Rhode Island.....	84.4	Illinois.....	88.3
Connecticut.....	75.9	Lower Michigan.....	86.1
Eastern New York.....	80.1	Upper Michigan.....	79.0
Western New York.....	84.5	Wisconsin.....	84.4
Eastern Pennsylvania.....	85.9	Minnesota.....	82.1
Western Pennsylvania.....	83.7	Iowa.....	80.1
New Jersey.....	83.3	Kansas.....	84.0
Delaware.....	83.7	Nebraska.....	82.4
Maryland.....	82.1	Missouri.....	85.8
District of Columbia.....	81.7	Colorado.....	85.1
Virginia.....	84.9	North Dakota.....	83.9
North Carolina.....	84.6	South Dakota.....	77.0
South Carolina.....	82.2	Southern California*.....	89.8
Georgia.....	87.2	Northern California*.....	90.2
Eastern Florida.....	93.6	Oregon*.....	85.7
Western Florida.....	85.0	Washington*.....	87.3
Alabama.....	89.6	By elements: Weather.....	86.0
Mississippi.....	87.7	Temperature.....	81.5
Louisiana.....	88.9	Monthly percentage of weather and	
Texas.....	90.6	temperature combined.....	84.2
Arkansas.....	87.4		
Tennessee.....	86.8		

* In determining the monthly percentage of weather and temperature combined, the Pacific coast states are not included. † The forecasts of temperature in districts east of the Rocky Mountains for August, 1890, were made with reference to the maximum temperature alone; that is, a prediction of warmer or cooler indicated that the maximum temperature of the day designated would be higher or lower than the maximum of the previous day. ‡ The monthly percentage of weather and temperature combined is determined by multiplying the percentage of weather by 6, and the percentage of temperature by 4, and dividing their sum by 10.

FORECASTS FOR 48 HOURS IN ADVANCE.

Appreciating the great importance that long time predictions possess for the general public the Chief Signal Officer has authorized forecasts for 48 and 72 hours, covering the 2d and 3d days in advance. These are optional with the forecast official, and are only made when clearly in the public interest, and cover, in all cases, considerable areas of country, and are not confined to localities.

Percentages of verifications of forecasts made for second day in advance. Number of predictions made: weather, 18; temperature, 26. Percentages of verifications: weather, 58.1; temperature, 65.4; weather and temperature combined, 61.8. No forecasts for 72 hours were made during the month.

CAUTIONARY SIGNALS FOR AUGUST, 1890.

Statement showing percentages of justifications of wind signals for the month of August, 1890:

Wind signals.—(Ordered by Captain H. H. C. Dunwoody.) Total number of signals ordered, 51, of which 32 were justified as to velocity, and all as to direction. Of the signals ordered, 50 were cautionary signals, of which 31 were justified, and one was a storm signal which was justified. 11 signals were ordered for easterly winds, and 40 for westerly winds, all of which were justified. Percentage of justifications, 62.5. No cold-wave signals were ordered during the month.

Percentages of verifications of weather and temperature signals reported by directors of the various State Weather Services for August, 1890.

States.	Weather.	Temperature.	States.	Weather.	Temperature.
Illinois.....	85.6	87.3	Nebraska.....	80.6	89.0
Iowa.....	81.6	93.2	New Jersey.....	75.9	85.8
Louisiana, northern.....	88.0	90.0	North and South Dakota.....	92.0	92.0
Louisiana, southern.....	79.0	92.0	Ohio.....	84.0	88.0
Minnesota.....	69.0	73.0	Pennsylvania.....	82.0	85.0
Missouri.....	85.0	87.0	South Carolina.....	94.5	79.1

STATE WEATHER SERVICES.

[Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.]

The following extracts and summaries are republished from reports for August, 1890, of the directors of the various state weather services:

ALABAMA.

The weather was unfavorable to the cotton crop, as it favored the development of rust, which caused considerable damage.

Temperature.—Highest monthly mean, 80, at Livingston; lowest monthly mean, 72.1, at Chepultepec; maximum, 97, at Eufaula, 7th, and at Marion, 27th; minimum, 50, at Florence, 23d, and at Double Springs, 31st.

Precipitation.—Greatest monthly, 7.80, at Florence; least monthly, 0.07, at Pine Apple.

Wind.—Prevailing direction, southwest.—Prof. P. H. Mell, Auburn, director; J. M. Quarles, Private, Signal Corps, assistant.

ARKANSAS.

Temperature.—The mean was about 2.0 above the normal; maximum, 104, at Lead Hill, 8th; minimum, 50, at Forrest City, 13th; greatest local monthly range, 46, at Lead Hill; least local monthly range, 19, at Winslow.

Precipitation.—The average was about 0.36 above the normal; greatest monthly, 10.52, at Winslow; least monthly, 0.15, at Malvern.—M. F. Locke, Commissioner of Agriculture, Little Rock, director; W. U. Simons, Sergeant, Signal Corps, assistant.

COLORADO.

Temperature.—The mean was 4.0 above the average for the last 4 years; highest monthly mean, 76.7, at Lamar; lowest monthly mean, 48.9, at Climax; maximum, 104, at Bennet, 6th, and at First View, 7th; minimum, 24, at Alma, 25th; greatest local monthly range, 66, at Julesburg; least local monthly range, 30, at Cumbres.

Precipitation.—The rainfall was 0.10 above the average for the last 4 years; the amount ranged from 5.41, at Waterville, to trace, at Westcliffe.

Wind.—Prevailing direction, west.—Prof. F. H. Loud, Colorado Springs, director; W. S. Miller, Sergeant, Signal Corps, assistant.

ILLINOIS.

Temperature.—The mean was 2.8 below the normal of the past 15 years; maximum, 104, at Atwood, East Peoria, and Pontiac, 3d; minimum, 40, at Aurora, 23d.

Precipitation.—The average was 0.36 below the normal of the last 12 years; greatest monthly, 7.06, at Jordan's Grove; least monthly, 0.95, at Collinsville.

Wind.—Prevailing directions, southeast and northwest.—*John Craig, Sergeant, Signal Corps, Springfield, in charge.*

INDIANA.

Temperature.—Highest monthly mean, 74.0, at Marengo, Shelbyville, and Muncie; lowest monthly mean, 65.0, at Mauzy; maximum, 100, at Huntingburgh, 1st, and at Angola, 3d; minimum, 40, at Delphi, 23d; greatest monthly range, 55 at Delphi; least monthly range, 32, at Butlerville.

Precipitation.—Greatest monthly, 8.20, at Marengo; least monthly, 2.50, at Columbia City.

Wind.—Prevailing direction, southwest.—*Prof. H. A. Huston, La Fayette, director; H. R. Patrick, Private, Signal Corps, assistant.*

IOWA WEATHER AND CROP SERVICE.

Temperature.—There was a general deficiency in temperature. There have been but two cooler Augusts in Iowa within the last twenty years, but the frost line was only barely touched on a few dates during the month, and no material damage has been reported; highest monthly mean, 73.6, at Glenwood; lowest monthly mean, 63.9, at Cresco; maximum, 102, at Belle Plaine, Blakeville, Glenwood, and Washington, 2d; minimum, 36, at Atlantic, 14th; greatest local monthly range, 63, at Atlantic; least local monthly range, 38, at Independence and Iowa City.

Precipitation.—The average was slightly below the normal; greatest monthly, 6.44, at Manson; least monthly, 1.02, at Omaha, Nebr.

Wind.—Prevailing direction, south.—*J. R. Sage, Des Moines, director; G. M. Chappel, Sergeant, Signal Corps, assistant.*

KANSAS.

Temperature.—Highest monthly mean, 81.7, at Kellogg; lowest monthly mean, 70.2, near Concordia; maximum, 115, at Kellogg, 9th; minimum, 40, at Lakin, 27th and 28th; greatest local monthly range, 66, at Lakin; least local monthly range, 39, at Collyer; greatest daily range, 46, at Gibson, 12th; least daily range, 7, at Leavenworth, 19th.

Precipitation.—Greatest monthly, 11.00, at Columbus; least monthly, 0.10, at Winona.

Wind.—Prevailing direction, southeast.—*Prof. J. T. Lovewell, Topeka, director; T. B. Jennings, Sergeant, Signal Corps, assistant.*

KENTUCKY.

Temperature.—The mean was about 3.0 below the normal; maximum, 101, at Pellville, 1st and 3d; minimum, 44, at Harrodsburgh, 31st; greatest monthly range, 55, at Harrodsburgh; least monthly range, 33, at Franklin.

Precipitation.—The average was about 2.50 above the normal; this excess was confined to the eastern and southern portions of the state, elsewhere it was nearly normal; greatest monthly, 8.68, at Mount Sterling; least monthly, 3.30, at Frankfort.

Wind.—Prevailing direction, southwest.—*Dr. E. A. Grant, Louisville, director; Frank Burke, Sergeant, Signal Corps, assistant.*

LOUISIANA.

Temperature.—The mean was nearly normal; highest monthly mean, 83.6, at Mandeville; lowest monthly mean, 76.5, at North Louisiana Experimental Station; maximum, 102, at Cameron, 21st; minimum, 59, at Minden and Liberty Hill, 30th; greatest local monthly range, 40, at Liberty Hill and Coushatta; least local monthly range, 19, at Abbeville.

Precipitation.—The average was nearly 1.00 above the normal; greatest monthly, 10.79, at Plaquemine; least monthly, 0.62, at Shreveport.

Wind.—Prevailing direction, south.—*R. E. Kerkam, Sergeant, Signal Corps, New Orleans, in charge.*

MICHIGAN.

Temperature.—The mean was 4.3 below the normal of the last fifteen years; highest monthly mean, 69.2, at Benton Harbor; lowest monthly mean, 57.5, at Crystal Falls; maximum, 104, at Bangor, 3d; minimum, 30, at East Lothrop and Roscommon, 23d; greatest local monthly range, 68, at Paw Paw; least local monthly range, 31, at Atlantic; greatest daily range, 43, at Clinton, Flint, and Roscommon, 26th; least daily range, 1, at Bellaire, 9th.

Precipitation.—The average was 0.10 above the normal of the last fifteen years; greatest monthly, 7.41, at Washington; least monthly, 1.28, at Weldon Creek.

Wind.—Prevailing direction, northwest.—*N. B. Conger, Sergeant, Signal Corps, Lansing, director.*

MINNESOTA.

Temperature.—The month was cooler than usual, and the deficiency in temperature was from 2.5 to 4.5 in various sections of the state; highest monthly mean, 66.2, at La Crosse, Wis.; lowest monthly mean, 59.1, at Pokegama Falls; maximum, 97, at Grand Meadow, 2d, and at Morris, 7th; minimum, 30, at Saint Vincent, 22d; greatest local monthly range, 62, at Saint Vincent; least local monthly range, 38, at Lake Winnibigoshish Dam; greatest daily range, 45, at Saint Vincent, 5th; least daily range, 3, at La Crosse, Wis., 12th, and at Duluth, 18th.

Precipitation.—The rainfall was slightly in excess in the central counties, in the upper and lower portions there were deficiencies of about 10 per cent., and in the vicinity of Saint Paul the deficiency amounted to 40 per cent.; greatest monthly, 3.96, at Red Wing; least monthly, 1.64, at Montevideo.

Wind.—Prevailing direction, southeast.—*John Healy, Corporal, Signal Corps, Saint Paul, in charge.*

MISSISSIPPI.

Temperature.—The mean was 1.9 below the normal; highest monthly mean, 81.6, at Moss Point; lowest monthly mean, 72.6, at Corinth; maximum, 100, at Columbus, 21st; minimum, 48, at Corinth, 26th; greatest monthly range, 48, at Corinth; least monthly range, 18, at Pearlinton.

Precipitation.—The average was 1.47 above the normal; greatest monthly, 8.29, at Louisville; least monthly, 0.50, at Kosciusko.

Wind.—Prevailing direction, variable.—*R. B. Fulton, Signal Corps, University, director.*

METEOROLOGICAL REPORT OF THE MISSOURI STATE BOARD OF AGRICULTURE.

Temperature.—The mean was about 2.5 below the normal in all parts of the state; highest monthly mean; 78.9, at Bradleyville; lowest monthly mean, 69.8, at Glenwood; maximum, 106, at Princeton, 3d; minimum, 41, at Glenwood, 20th; greatest local monthly range, 60, at Glenwood; least local monthly range, 30, at Lebanon and Bradleyville.

Precipitation.—The average was about 0.75 above the normal; greatest monthly, 15.39, at Sarcoxie; least monthly, 1.10, at Wither's Mills.—*Levi Chubbuck, Secretary of State Board of Agriculture, Columbia, director; A. L. McRae, Sergeant, Signal Corps, assistant.*

NEBRASKA.

Temperature.—The mean was 1.5 below the normal; the maximum, 108, occurred at several stations early in the month; and the minimum, 34, is lower than any August minimum, except that of 1888, which was the same.

Precipitation.—The rainfall was quite evenly distributed; from 1.00 to 3.00 fell over the greater part of the state.—*Prof. Goodwin D. Swezey, Crete, director; G. A. Loveland, Sergeant, Signal Corps, assistant.*

NEVADA.

Normal temperature, numerous thunder-storms, and heavy rains were the features of the month.

Temperature.—Maximum, 110, at El Dorado Canyon, 19th; minimum, 28, at Elko, 26th; greatest local monthly range, 75, at Elko; least local monthly range, 34, at Younts' Ranch; greatest daily range, 55, at Pioche; least daily range, 15, at Beowawe.

Precipitation.—Greatest monthly, 3.44, at Tuscarora; least monthly, 0.10, at Verdi.

Wind.—Prevailing directions, south and southwest.—*Prof. Charles W. Friend, Carson City, director; H. E. Wilkinson, Corporal, Signal Corps, assistant.*

NEW ENGLAND METEOROLOGICAL SOCIETY.

Temperature.—The mean was 1 below the normal; highest monthly mean, 70.8, at Olneyville; lowest monthly mean, 59.9, at Berlin Falls; maximum, 94, at Plymouth, N. H., 4th, and at Lawrence, 5th; minimum, 32, at Berlin Falls, 16th; greatest local monthly range, 61, at Berlin Falls; least local monthly range, 25, at Nantucket; greatest daily range, 44, at Plymouth, N. H., 17th; least daily range, 1, at Cotuit, 9th.

Precipitation.—The average was 0.30 above the normal; greatest monthly, 8.85, at Stratford; least monthly, 2.05, at Block Island.

Wind.—Prevailing direction, southwest.—*Prof. William H. Niles, Boston, Mass., president; Prof. Winslow Upton, Providence, R. I., secretary; J. Warren Smith, Private, Signal Corps, assistant.*

NEW JERSEY.

Temperature.—The mean was 0.5 below the normal; highest monthly mean, 76, at Trenton; lowest monthly mean, 68.5, at Newton; maximum, 99, at Beverly, 1st; minimum, 40, at Newton, 23d; greatest local monthly range, 54, at Beverly, 1st; least local monthly range, 28, at Ocean City; greatest daily range, 33, at Tenafly and Gillette, 17th; least daily range, 3, at Asbury Park, 13th.

Precipitation.—The average was 0.16 below the normal; greatest monthly, 7.51, at Atlantic City; least monthly, 2.89, at Woodbury.

Wind.—Prevailing direction, northwest.—*E. W. McGann, Sergeant, Signal Corps, New Brunswick, in charge.*

NEW YORK.

Temperature.—Highest monthly mean, 72.4, at New York City and Fort Wadsworth; lowest monthly mean, 59.9, at Keene Valley; maximum, 100, at Marshland, 4th, and at Madison Barracks, 5th; minimum, 33, at Hyndsville, 23d; greatest local monthly range, 61, at Hyndsville and Marshland; least local monthly range, 32, at Setauket.

Precipitation.—Greatest monthly, 9.46, at Marlborough; least monthly, 0.80, at Madison Barracks.

Wind.—Prevailing direction, west.—*Prof. E. A. Fuertes, Ithaca, director; I. G. Gardiner, Corporal, Signal Corps, assistant.*

NORTH CAROLINA.

Temperature.—The mean was 2.3 below the normal; highest monthly mean, 78.6, at Kitty Hawk; lowest monthly mean, 67.4, at Highlands; maximum, 98, at Kitty Hawk, 1st, and at New Berne, 17th; minimum, 40, at Highlands, 12th; greatest local monthly range, 50, at Douglas; least local monthly range, 19, at Hatteras.

Precipitation.—The average was 0.75 below the normal; greatest monthly, 10.72, at Willetton; least monthly, 2.30, at Franklin.

Wind.—Prevailing direction, southwest.—*Dr. Herbert B. Battle, Raleigh, director; C. F. von Herrmann, Sergeant, Signal Corps, assistant.*

NORTH AND SOUTH DAKOTA.

Temperature.—The mean was 0.5 below the normal; greatest monthly, 72.0, at Fort Sully, Saint Lawrence, and Spearfish, S. Dak.; lowest monthly mean, 59, at Gallatin, N. Dak.; maximum, 105, at Highmore, S. Dak., 5th; minimum, 31, at Webster, S. Dak., 22d; greatest local monthly range, 72, at Woonsocket, S. Dak.; least local monthly range, 35, at Wild Rice, S. Dak.

Precipitation.—The average was about 0.81 below the normal; greatest monthly, 3.39, at Webster and Wild Rice, S. Dak.; least monthly, 0.04, at New England City, N. Dak.

Wind.—Prevailing direction, southeast.—S. W. Glenn, Sergeant, Signal Corps, Huron, S. Dak., in charge.

OHIO.

Temperature.—The mean of the northern section, the middle section, the southern section, and of the state was 0.9, 0.8, 1.1, and 0.9, respectively, below the average for the sections and state; maximum, 103, at North Lewisburgh, 3d; minimum, 40, at Wooster, 24th; greatest daily range, 44.1, at Wauseon, 12th; least daily range, 4, at Hanging Rock, 14th.

Precipitation.—The precipitation was largely in excess of the usual amount in all sections, the average for the northern section, the middle section, the southern section, and the state, was 1.04, 0.88, 2.05, and 1.33, respectively, above the normal for the sections and state; greatest monthly, 8.38, at Georgetown; least monthly, 1.93, at Hudson.

Wind.—Prevailing direction, southwest.—Prof. B. F. Thomas, Columbus, director; Lieut. Charles E. Kilbourne, secretary; C. M. Strong, Corporal, Signal Corps, assistant.

OREGON.

Temperature.—The mean was about the normal; highest monthly mean, 74.4, at Hood River; lowest monthly mean, 59.0, at Gold Beach; maximum, 100, at McMinnville and Grant's Pass; minimum, 33, at North Powder.

Precipitation.—The average was 0.48 below the normal. Over 1.00 fell along the extreme northwest coast, and in parts of the state from trace to 0.79.

Wind.—Prevailing direction, northwest.—Hon. H. E. Hayes, Master State Grange, Oswego, director; B. S. Pague, Sergeant, Signal Corps, assistant.

PENNSYLVANIA.

Temperature.—The mean was 2.0 below the normal; highest monthly mean, 73.6, at Philadelphia; lowest monthly mean, 60.1, at Wellsborough; maximum, 98, at New Castle, 3d, and at Gettysburgh, 6th; minimum, 34, at Somerset, 24th; greatest local monthly range, 29, at Huntingdon; least local monthly range, 13, at Erie; greatest daily range, 47, at New Castle, 16th; least daily range, 2.0, at Grampian Hills, 21st.

Precipitation.—The average was over 1.50 above the normal; greatest monthly, 9.65, at Carlisle; least monthly, 2.58, at Philadelphia.

Wind.—Prevailing direction, west.—Under direction of the Franklin Institute, Philadelphia; T. F. Townsend, Sergeant, Signal Corps, assistant.

SOUTH CAROLINA.

Temperature.—The mean was 0.4 above the normal of the last 3 years; highest monthly mean, 80.0, at Port Royal; lowest monthly mean, 72.1, at Camden; maximum, 96, at Blackville, 1st; minimum, 51, at Yorkville, 24th; greatest local monthly range, 44, at Cheraw; least local monthly range, 18, at Timmonsville.

Precipitation.—Greatest monthly, 7.95, at Winnsborough; least monthly, 1.61, at Port Royal.

Wind.—Prevailing direction, south.—Hon. A. P. Butler, Columbia, director; G. E. Hunt, Sergeant, Signal Corps, assistant.

TENNESSEE.

The meteorological conditions were for the most part near the normal, except the period of low temperature during the last two decades, and the rainfall, which was considerably above.

Temperature.—Highest monthly mean, 77.0, at Union City and Memphis; lowest monthly mean, 69.6, at Andersonville; maximum, 99, at Watkins, 4th; minimum, 48, at Nunnally, 12th, at Andersonville, 25th, and at Hohenwald, 24th; greatest local monthly range, 49, at Hohenwald; least local monthly range, 29, at Covington; greatest daily range, 40, at Hohenwald, 24th; least daily range, 2, at Nunnally, 5th, Ashwood, 7th, Florence Station, 26th, and at Knoxville, Jacksboro, and Rugby, 28th.

Precipitation.—Greatest monthly, 9.91, at Springdale; least monthly, 2.76, at Rockwood.

Wind.—Prevailing direction, southwest.—J. D. Plunket, M. D., Nashville, director; H. C. Bate, Signal Corps, assistant.

TEXAS.

Temperature.—The temperature was slightly below the normal, except in the extreme western portion, where the normal prevailed; highest monthly mean, 87.5, at Haskell; lowest monthly mean 75.6, at Panhandle; maximum, 106, at Haskell, 30th; minimum, 51, at Panhandle, 8th; greatest local monthly range, 52, at Coldwater; least local monthly range, 16, at Corpus Christi and La Grange.

Precipitation.—The rainfall was deficient, except in a few localities near the coast and over the northwestern portion of the state, where the amount equalled, and, in a few instances, exceeded, the normal; greatest monthly, 6.29, at Orange; least monthly, 0.40, at Weatherford.—D. D. Bryan, Galveston, director; I. M. Cline, Sergeant, Signal Corps, assistant.

Meteorological record of Army post surgeons, voluntary, and other co-operating observers, August, 1890.

Stations.	Temperature. (Fahrenheit.)			Precip'n.		Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean.				Max.	Min.	Mean.	
Alabama.						California—Cont'd.				
Bermuda *†.....	90	64	77.0	2.31		Brentwood.....	100	62	80.5	0.00
Camden.....	91	60	74.0	0.65		Brighton.....	100	63	75.9	0.00
Citronelle.....	96	62	80.7	5.13		Byron.....	100	62	75.2	0.00
Columbiana.....	93	55	76.3	4.78		Caliente.....	102	70	79.3	0.00
Decatur (1).....	94	50	75.5	4.22		Calistoga.....	93	48	67.8	0.00
Decatur (2).....	91	53	74.3	4.77		Castroville.....	78	51	62.8	0.00
Double Springs.....	97	58	78.9	0.51		Centerville.....	98	60	71.2	0.00
Eufaula.....	94	59	79.0	5.83		Chico.....	104	60	79.5	0.00
Evergreen.....	89	70	79.4	3.71		Cisco.....	82	50	63.9	0.00
Livingston (1).....	93	57	77.5	3.96		Colfax.....	98	58	75.5	0.00
Livingston (2).....	97	55	78.6	1.94		Corning.....	111	65	83.3	0.00
Marion.....	94	60	78.0	3.84		Crescent City.....	103	55	75.1	0.00
Mt. Vernon B'ks.....	97	58	77.6	5.75		Delta.....	98	60	74.2	0.00
Opelika.....	95	55	78.8	0.70		Downey.....	91	62	76.7	0.05
Pine Apple.....	95	58	80.0	4.05		Dunsmuir.....	103	60	74.1	0.00
Selma (2).....	94	52	75.7	5.85		El Verano.....	95	52	67.7	0.00
Tusculum (2).....	92	50	71.6	4.71		Esparto.....	98	60	79.0	0.02
Valley Head.....	92	50	71.6	4.71		Evergreen.....	102	61	76.6	0.00
Alaska.						Farmington.....	98	54	73.6	0.00
Juneau.....	70	43	55.6	2.21		Felton.....	106	60	78.0	0.00
Arizona.						Fernando.....	97	64	72.3	0.00
Aris. Canal Co. dam.....	107	70	83.8	1.80		Florence.....	102	65	80.8	0.00
Ash Canyon.....	98	58	75.6	3.48		Folsom.....	91	44	68.7	0.05
Ash Creek.....	98	70	81.9	4.81		Fort Bidwell.....	102	41	71.3	T.
Ash Springs.....	84	56	70.0	5.71		Fort Gaston.....	76	48	58.7	0.02
Benson.....	108	74	86.9	3.41		Fort Mason.....	108	61	84.5	0.00
Bisbee.....	91	56	75.3	3.90		Fresno.....	104	62	81.2	0.00
Casa Grande.....	91	56	75.3	3.90		Fruto.....	100	58	76.1	0.00
Chino.....	85	44	64.2	4.60		Galt.....	94	49	73.0	0.00
Chiri Canua M't's.....	95	62	78.5	7.18		Georgetown.....	94	52	66.2	0.00
Cooley's.....	95	62	78.5	7.18		Gilroy.....	97	65	76.1	1.37
Crittenden.....	95	62	78.5	7.18		Girard.....	97	65	76.1	0.00
Dragon.....	95	62	78.5	7.18		Glen Ellen.....	98	51	65.6	0.00
Dos Cabezas.....	95	62	78.5	7.18		Goshen.....	108	62	81.5	0.00
Eagle Pass.....	95	62	78.5	7.18		Grass Valley.....	95	55	65.4	0.00
Florence.....	107	60	84.4	1.89		Haywards.....	95	52	66.5	0.00
Fort Apache.....	91	51	70.5	4.16		Hollister.....	95	48	72.1	0.46
Fort Bowie.....	88	56	71.7	4.06		Hornbrook.....	96	48	59.2	0.00
Fort Grant.....	90	54	72.6	4.54		Hydesville.....	76	39	59.2	0.10
Fort Huachuca.....	89	54	71.2	4.49		Indio.....	114	75	90.9	T.
Fort Lowell.....	101	63	80.2	5.58		Iowa Hill.....	96	56	75.9	T.
Fort McDowell.....	110	68	86.1	1.55		Julian.....	87	60	71.4	1.25
Fort Mojave.....	112	70	89.9	1.50		Keeler.....	100	75	85.6	1.30
Fort Verde.....	104	58	78.2	3.90		Keene.....	95	63	75.3	1.40
Gila Bend.....	104	78	88.4	3.90		Kingsburgh.....	105	62	82.7	0.00
Grand Central Mill.....	95	53	73.6	2.57		King City.....	96	46	68.6	0.00
Holbrook.....	95	53	73.6	2.57		Knight's Landing.....	94	60	74.7	0.00
Lochiel.....	85	62	70.5	7.18		La Grange.....	111	55	80.6	T.
Maricopa.....	105	78	89.7	4.29		Laurel.....	95	50	69.8	0.00
Mount Huachuca.....	85	51	70.6	4.46		Lemoore.....	110	60	80.4	0.00
Natural Bridge.....	95	53	73.6	2.57		Lewis Creek.....	100	61	80.7	0.00
New River.....	104	60	82.9	1.69		Livermore.....	98	56	71.9	0.00
Pantano.....	102	63	78.4	6.30		Livingston.....	106	60	83.6	0.00
San Carlos.....	62	42	52.0	3.26		Long Beach.....	90	60	71.7	0.00
San Simon.....	101	62	82.8	2.46		Los Angeles.....	99	61	74.7	0.00
Show Low.....	106	68	87.4	3.17		Los Banos (2).....	103	69	85.3	0.02
Signal.....	106	68	87.4	3.17		Los Gatos (1).....	95	55	70.3	0.00
Strawberry.....	106	68	87.4	3.17		Los Gatos (2).....	93	45	67.7	T.
Teviston.....	106	68	87.4	3.17		Mammoth Tank.....	116	75	93.1	0.00
Tip Top.....	106	68	87.4	3.17		Martinez.....	82	54	68.4	0.00
Tombstone.....	96	57	75.6	6.26		Menlo Park.....	92	53	66.3	0.00
Tucson (1).....	99	66	81.7	5.23		Modesto.....	103	63	78.9	0.00
Tombstone.....	96	57	75.6	6.26		Mojave.....	104	68	83.9	0.00
Tucson (2).....	99	66	81.7	5.23		Monterey.....	86	50	61.0	0.00
Walnut Grove.....	99	66	81.7	5.23		Napa.....	99	51	67.3	0.00
Walnut Ranch.....	98	60	77.2	5.20		Newark.....	90	55	68.3	0.00
Wilcox.....	98	60	77.2	5.20		Niles.....	92	55	69.1	0.00
Wilcox.....	98	60	77.2	5.20		Norwalk.....	102	53	74.9	0.00
Arkansas.						Oakland (1).....	89	50	62.2	T.
Arkansas City.....	105	65	83.9	0.00		Oakland (2).....	76	54	60.3	0.00
Camden.....	105	65	83.9	0.00		Ogilby.....	119	82	91.5	0.05
Dardenelle.....	94	50	72.6	1.17		Ontario.....	102	70	82.1	0.16
Devall's Bluff.....	94	50	72.6	1.17		Oroville.....	99	60	79.8	0.00
Forrest City.....	94	50	72.6	1.17		Pajaro.....	80	48	61.3	0.00
Fulton.....	94	50	72.6	1.17		Paso Robles.....	99	52	70.3	0.00
Helena (1).....	98	58	78.6	4.23		Petaluma.....	94	53	66.4	0.07
Helena (2).....	98	58	78.6	4.23		Placerville (1).....	101	52	72.8	0.00
Hot Springs.....	98	57	78.3	3.83		Placerville (2).....	94	46	70.0	T.
Lead Hill.....	104	58	78.3	5.73		Pleasanton.....	95	41	67.5	0.00
Little Rock B'ks.....	99	59	78.9	1.90		Pomona.....	103	63	75.1	0.00
Malvern.....	94	60	78.6	0.15		Porterville.....	106	70	83.0	0.15
Newport (1).....	93	55	75.6	4.63		Presidio of S. F.....	82	45	57.6	0.00
Newport (2).....	93	55	75.6	4.63		Puente.....	102	65	76.2	0.00
Pine Bluff.....	90	60	80.3	0.78		Ravenna.....	100	60	78.1	0.00
Prescott.....	94	64	79.6	1.66		Red Bluff.....	103	64	82.2	0.00
Russellville.....	96	60	78.8	6.47		Redding.....	112	60	83.9	0.00
Texarkana.....	98	60	81.5	0.76		Riverside.....	105	52	75.8	0.55
Winslow.....	84	65	74.5	10.52		Rocklin.....	105	60	79.8	0.00
California.						Rumsey.....	102	65	82.7	0.00
Alcade.....	105	65	83.9	0.00		Sacramento (1).....	90	46	66.8	T.
Alcatraz Island.....	68	43	56.9	0.00		Salinas (1).....	75	52	59.8	T.
Almaden.....	93	53	68.6	0.00		Salinas (2).....	68	55	60.4	0.00
Anaheim.....	104	62	75.5	0.00		Salton.....	113	75	89.3	0.37
Angel Island.....	83	47	65.0	0.00		Sanger Junction.....	105	65	87.2	0.00
Antioch.....	94	68	76.1	0.00		San Ardo.....	102	48	73.1	0.04
Aptos.....	90	50	62.6	0.00		San Diego B'ks.....	89	59	71.0	T.
Athlone.....	110	60	81.7	0.00		San Gabriel.....	102	60	75.9	0.00
Auburn.....	98	55	75.1	0.00		San Jose.....	90	50	66.8	0.00
Bakersfield.....	103	71	87.1	0.03		San Mateo.....	85	52	65.3	0.00
Barstow.....	106	58	82.7	0.15		San Miguel.....	100	55	71.0	0.00
Belmont.....	90	54	68.9	0.00		San Pedro.....	100	63	74.7	0.00
Benicia Barracks.....	97	51	68.0	0.00		Santa Ana.....	106	6		
Berendo.....	108	62	83.0	0.00						
Berkeley.....	83	52	60.3	T.						
Boulder Creek.....	108	43	66.5	0.00						

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<i>California—Cont'd.</i>	°	°	°	<i>Ins.</i>	<i>Colorado—Cont'd.</i>	°	°	°	<i>Ins.</i>
Santa Barbara (1).....	98	52	67.9	0.00	T. S. Ranch.....	96	47	72.2	3.12
Santa Barbara (2).....	95	51	73.5	0.00	Thont.....	97	43	68.0	2.23
Santa Clara.....	97	47	65.7	.....	Twin Lakes.....	.....	.....	.....	1.97
Santa Cruz (1).....	92	52	68.3	0.00	Vilas.....	.....	.....	.....	0.69
Santa Cruz (2).....	91	43	62.9	0.00	Villa Grove.....	.....	.....	.....	0.12
Santa Margarita.....	96	46	64.7	0.00	Watervale.....	.....	.....	.....	5.41
Santa Monica.....	81	68	71.4	0.00	Watkins.....	94	48	70.6	3.12
Santa Paula.....	95	60	74.0	0.00	Westcliffe.....	85	32	57.4	.....
Santa Rosa.....	88	48	63.9	0.00	Wray.....	.....	.....	.....	1.09
Selma.....	100	61	81.9	0.00	Yuma.....	.....	.....	.....	1.58
Seven Palms.....	118	73	91.3	0.25	<i>Connecticut.</i>				
Shingle Springs.....	102	60	77.7	0.00	Birmingham.....	.....	.....	.....	4.47
Sims.....	101	55	74.7	0.00	Canton.....	89	46	67.2	5.36
Sisson.....	94	47	69.1	0.00	Colchester.....	84	48	68.5	.....
Soledad.....	92	50	65.5	0.00	Falls Village.....	.....	.....	.....	6.06
Sonoma.....	92	44	66.4	0.04	Fort Trumbull.....	89	43	72.0	2.53
Soquel.....	82	50	66.7	0.00	Hartford (2).....	.....	.....	.....	4.05
South Vallejo.....	88	48	62.2	0.00	Lebanon.....	.....	.....	.....	3.88
Spadra.....	103	60	74.3	0.00	Mansfield.....	84	45	66.0	4.26
Steeles.....	92	48	65.7	.....	Middletown.....	88	48	67.8	4.66
Stockton (2).....	97	51	74.1	0.00	New Hartford (1).....	86	47	65.0	6.30
Suisun City.....	99	57	70.2	0.00	New Hartford (2).....	.....	.....	.....	7.04
Susanville.....	98	56	75.7	0.15	Newington.....	.....	.....	.....	2.25
Tehachapi.....	90	56	74.4	0.00	North Woodstock.....	.....	.....	.....	4.95
Tehama.....	101	65	79.4	0.00	Southington.....	86	51	67.9	3.37
Templeton.....	105	50	64.9	0.00	South Manchester.....	.....	.....	.....	4.16
Towles.....	90	58	71.2	0.00	Thompson.....	83	47	65.8	.....
Traver.....	93	58	78.1	0.00	Uncasville.....	.....	.....	.....	4.67
Truckee.....	88	40	64.9	0.22	Voluntown.....	85	45	67.08	4.67
Tulare.....	104	62	84.0	0.00	Wallingford.....	.....	.....	.....	3.84
Turlock.....	106	62	80.4	0.12	Waterbury.....	89	44	69.1	4.50
Upper Mattole.....	95	48	66.3	.....	West Simsbury.....	.....	.....	.....	5.23
Vacaville (1).....	99	59	74.7	.....	<i>Delaware.</i>				
Vacaville (2).....	99	62	75.1	0.00	Kirkwood.....	.....	60	74.4	.....
Valley Springs.....	90	60	76.8	0.00	<i>District of Columbia.</i>				
Vina.....	106	70	83.0	0.00	Washington B'ks.....	95	50	75.5	4.45
Volcano Springs.....	120	80	95.3	0.07	<i>Florida.</i>				
Volta.....	105	63	79.6	0.00	Alva.....	98	68	77.9	8.51
Walla Walla Ok.....	92	39	68.0	0.85	Archer.....	99	60	81.6	2.72
Walnut Creek.....	100	55	71.9	.....	Fort Barrancas.....	92	67	81.0	6.30
Westley.....	100	68	82.0	0.00	Fort Meade.....	91	66	79.0	7.39
Wheatland.....	99	53	75.4	.....	Gainesville.....	95	63	81.0	5.77
Whittier.....	99	59	74.4	0.00	Homeland.....	94	72	80.6	4.00
Winters.....	104	62	84.7	0.00	Hypoluxo.....	.....	74	80.0	9.96
Woodland.....	92	57	73.4	0.00	Lake City.....	97	61	80.9	4.99
<i>Colorado.</i>					Madison.....	88	71	80.4	3.16
Abbott.....	.....	.....	2.11	.....	Manatee.....	94	69	80.3	7.12
Alma.....	75	24	52.3	2.29	Merritt's Island.....	92	70	81.6	2.21
Amherst.....	.....	.....	1.01	.....	St. Francis B'ks.....	90	70	78.8	4.32
Apishapa.....	96	50	74.6	1.72	San Antonio.....	93	70	76.5	4.73
Aroya.....	.....	.....	1.66	.....	Tallahassee.....	90	63	77.6	4.00
Bennet.....	104	58	74.9	2.02	Villa City.....	98	68	81.0	4.91
Boulder Canon.....	.....	.....	4.25	.....	<i>Georgia.</i>				
Box Elder.....	.....	.....	2.25	.....	Albany.....	94	62	80.4	4.93
Brandon.....	.....	.....	0.85	.....	Allapaha.....	95	58	77.5	2.76
Breckenridge.....	80	26	53.0	1.76	Athens (1).....	90	59	75.0	5.14
Brush.....	.....	.....	0.99	.....	Athens (2).....	90	56	75.0	7.19
Byers.....	101	54	71.8	0.95	Bainbridge.....	90	64	77.8	1.98
Canon City.....	101	51	72.2	0.94	Blakely.....	94	65	81.0	4.20
Castle Rock.....	96	42	70.4	2.69	Camak.....	93	58	77.6	2.62
Chromot.....	.....	.....	1.44	.....	Cartersville.....	94	56	76.4	6.55
Climax.....	66	35	48.9	2.45	Columbus.....	88	64	77.8	2.44
Crook.....	96	52	70.4	0.85	Diamond.....	.....	53	70.6	2.99
Cumbres.....	71	41	52.1	2.17	Eastman.....	100	58	79.1	2.35
Delta.....	98	44	71.3	1.59	Forsyth.....	92	66	78.5	2.74
Dillon.....	.....	.....	2.64	.....	Fort Gaines.....	94	58	79.4	3.37
Eagle Farm.....	.....	.....	3.37	.....	Fort McPherson.....	93	57	75.0	3.63
First View.....	104	54	72.4	1.92	Gainesville.....	88	54	72.8	6.44
Fort Collins.....	95	40	66.0	3.14	Gillsville.....	88	64	77.7	4.62
Fort Crawford.....	92	43	66.0	1.58	Griffin.....	90	60	76.5	5.93
Fort Lewis.....	89	43	64.2	2.35	Hephzibah.....	90	65	77.0	3.50
Fort Logan.....	96	46	69.2	1.33	Louisville.....	100	54	80.0	1.46
Fort Morgan.....	.....	.....	1.24	.....	Macon.....	98	60	79.8	2.78
Georgetown.....	80	42	58.8	2.50	Marietta.....	88	57	72.5	4.90
Greeley.....	.....	.....	1.07	.....	Milledgeville.....	91	59	77.9	4.42
Greenhorn.....	94	53	66.8	2.22	Millen.....	98	54	79.2	2.14
Hardin.....	.....	.....	3.80	.....	Monticello.....	.....	64	75.8	1.92
Hugo.....	95	51	73.5	2.70	Newnan.....	95	40	70.0	1.92
Husted.....	100	42	66.2	4.49	Point Peter.....	.....	60	74.6	4.95
Julesburg.....	102	36	75.0	0.50	Perry.....	.....	68	78.8	1.42
Kirk.....	.....	.....	2.04	.....	Quitman (2).....	98	62	81.2	2.35
Kit Carson.....	98	62	78.4	1.50	Thomasville (1).....	94	61	80.2	2.76
Lamar.....	103	52	76.7	1.63	Toccoa.....	92	54	75.2	3.77
Las Animas.....	103	50	74.2	0.90	Union Point.....	94	54	77.6	10.16
La Veta.....	.....	.....	2.54	.....	Washington.....	92	56	76.8	2.87
Leadville.....	74	31	52.2	0.68	Way Cross.....	94	60	79.8	1.50
Le Roy.....	101	47	70.8	1.41	Waynesborough.....	97	58	79.6	1.78
Longmont.....	101	44	69.4	2.75	West Point.....	92	68	80.4	3.88
Magnolia.....	94	50	69.5	1.38	<i>Idaho.</i>				
Monte Vista.....	89	37	63.0	0.92	American Falls.....	100	38	67.0	0.55
Morraine.....	84	32	58.4	3.40	Beaver.....	.....	.....	.....	2.80
Morrison.....	83	46	61.4	1.53	Boise Barracks.....	99	41	70.5	0.24
Pagosa Springs.....	88	44	64.6	1.10	Bonanza.....	84	24	56.3	0.92
Parachute.....	.....	.....	1.04	.....	Era.....	88	34	61.0	0.04
Peyton.....	.....	.....	2.89	.....	Fort Sherman.....	92	42	65.8	1.05
Pinkhampton.....	.....	.....	2.01	.....	Henry's Lake.....	91	30	54.8	1.68
Red Cliff.....	90	52	69.5	.....	Kootenai.....	92	45	66.2	1.69
River Bend.....	103	47	73.2	0.74	Mullan.....	95	38	59.4	0.80
Rocky Ford.....	.....	.....	3.25	.....	Payette.....	106	45	73.0	0.14
Sanborn.....	.....	.....	0.91	.....	Soda Springs.....	.....	.....	.....	0.63
San Luis Ex. Sta.....	89	38	62.8	0.91	<i>Illinois.</i>				
Sedgewick.....	.....	.....	0.63	.....	Atwood.....	104	42	69.8	2.91
Sheridan Lake.....	.....	.....	1.80	.....	Aurora (1).....	98	40	65.0	2.38
Springfield.....	.....	.....	1.49	.....	Aurora (2).....	90	44	65.8	2.77
Sterling.....	102	45	72.2	0.85	Beardstown.....	.....	.....	.....	2.00

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<i>Illinois—Cont'd.</i>					<i>Iowa—Cont'd.</i>				
Beason.....	97	44	68.1	2.90	Glenwood (1).....	102d	48d	73.6	4.08
Belvidere.....	94	45	66.6	3.22	Grinnell.....	98	46	69.0	4.28
Centralia.....	100	52	77.0	2.92	Hampton.....	97	46	65.0	4.00
Charleston.....	93	43	70.6	1.87	Humboldt.....	96	38	65.0	4.54
Collinsville.....	98	50	73.4	0.95	Independence.....	91	53	67.1	2.97
Cockrell.....	102	47	70.6	4.93	Iowa City.....	88	50	66.0	2.29
Dwight.....	101	43	72.0	2.05	Irwin.....	94	36d	68.1	2.55
East Peoria.....	104	54	73.9	2.29	Larrabee.....	.....	.....	.....	3.92
Fort Sheridan.....	98d	49	67.6	2.47	Le Claire.....	.....	.....	.....	1.03
Goleta.....	96	60	75.5	2.58	Logan.....	93	43	70.4	1.19
Grand Tower.....	.....	.....	.....	2.64	Manson.....	98	40	68.3	6.44
Greenville.....	101	45	72.4	2.60	Maquoketa.....	98	48	68.4	5.42
Griggsville.....	92	56	70.7	1.85	McAusland.....	100	52	71.7	2.08
Hennepin.....	102	42	68.8	1.45	Monticello.....	96	44	66.7	4.97
Irishtown.....	.....	.....	.....	1.22	Mount Pleasant.....	92	57	68.9	2.03
Jordan's Grove.....	94	50	72.8	7.06	Mount Vernon.....	96	51	69.9	5.36
Lacon.....	98	49	70.0	1.85	Muscatine.....	98	54	68.9	2.35
Lanark.....	93	48	66.7	2.96	Osgo.....	.....	.....	.....	6.20
Louisville.....	97	50	74.1	3.05	Oskaloosa (1).....	98	53	69.3	2.78
Martinsville.....	.....	.....	71.4	4.24	Sac City.....	90	35	63.3	1.70
Mascoutah.....	99	52	74.6	1.90	Storm Lake.....	92	50	67.8	3.99
McLeansborough.....	101	46	72.3	7.05	Vinton.....	98	48	66.6	3.07
Mount Carmel.....	.....	.....	.....	6.14	Washington.....	102	48	72.7	2.65
Olney (1).....	96	50	72.5	4.78	Webster City.....	99	45	66.4	1.75
Olney (2).....	98	56	71.4	4.44	Wesley.....	93	34	63.8	1.25
Oswego.....	100	44	67.4	2.65	West Bend.....	92	46	64.9	2.77
Ottawa.....	101	44	71.0	2.72	<i>Kansas.</i>				
Palestine.....	97	46	69.2	3.56	Abilene.....	99	58	74.4	5.30
Pana.....	98	57	73.6	3.66	Allison.....	108	52	73.8	2.16
Peoria (1).....	.....	.....	.....	2.31	Alton.....	110	52	76.8	2.61
Peoria (2).....	102	52	73.3	2.39	Arlington.....	.....	.....	.....	2.85
Philo.....	98	42	70.1	1.81	Bucklin.....	.....	.....	.....	3.20
Pontiac.....	104	46	71.0	1.95	Buffalo Park.....	107	61	.....	1.75
Riley.....	96	46	65.2	3.83	Burr Oak.....	103	50	.....	5.87
Rockford.....	97	43	67.7	3.38	Cawker City.....	100	60	76.8	1.30
Rock Island Ase'l.....	102	34d	63.6	2.09	Coldwater.....	102	57	.....	3.95
Rushville.....	98	49	69.3	2.14	Collyer.....	101	62	78.3	2.00
Sandwich.....	96	.....	.....	3.32	Columbus.....	.....	.....	.....	11.00
Sycamore.....	98	43	65.8	2.07	Concordia.....	101	46	70.2	4.42
Warsaw.....	.....	.....	.....	1.07	Conway.....	.....	.....	.....	5.65
Watseka.....	101	41	67.3	2.70	Cunningham.....	108	56	78.3	0.64
White Hall.....	96	48	74.8	1.63	Downs.....	.....	.....	.....	1.21
Winnebago.....	100	51	69.8	2.55	Dwight.....	.....	.....	.....	5.25
<i>Indiana.</i>					Elco.....	106	58	75.4	5.42
Angola.....	100	47	69.6	3.32	Elk Falls.....	102	62	80.4	3.22
Butlerville.....	86	54	70.7	4.66	Ellis (2).....	109	60	.....	1.00
Cannelton.....	96	46	72.6	4.73	Emporia.....	99	57	73.8	6.50
Columbia City.....	95	43	68.7	2.50	Englewood.....	101	60	78.9	3.23
Columbus.....	95	49	69.8	6.00	Eureka Ranch.....	112	52	78.2	2.48
Connersville.....	95	53	69.1	2.85	Ft. Leavenworth (1).....	100	55	70.9	5.38
Crandall.....	97	50	73.0	3.75	Ft. Leavenworth (2).....	95	55	71.6	4.50
De Gonia Springs.....	91	51	72.8	6.67	Fort Riley.....	103	56	75.2	7.46
Delphi.....	95	40	66.3	3.19	Fremont.....	108	41	76.0	2.10
Evansville.....	.....	.....	.....	2.53	Gibson.....	111	50	76.2	3.19
Farmland.....	96	50	70.0	5.96	Globe.....	99	58	73.7	4.16
Franklin.....	98	50	70.0	3.82	Gove City.....	119	54	77.0	0.92
Huntingburgh.....	100	60	73.9	5.87	Grainfield.....	104	62	.....	1.00
Huntington.....	.....	.....	.....	3.78	Grenola.....	109	62	80.3	4.30
Jeffersonville.....	94	51	72.9	4.31	Grinnell.....	108	66	.....	1.80
La Fayette.....	97	43	70.2	7.17	Havensville.....	101	54	73.5	6.00?
Logansport (1).....	.....	.....	.....	3.51	Horton.....	104	50	75.1	4.63
Logansport (2).....	98	53	67.9	2.67	Independence.....	105	59	76.6	3.06
Marengo.....	96	53	74.0	8.20	Junction City.....	.....	.....	.....	6.16
Marion.....	96	52	67.5	2.70	Kansas City.....	102	54	74.8	4.32
Mauzy.....	98	40	68.0?	3.48	Kellogg.....	115	57	81.7	3.96
Mount Vernon (1).....	.....	.....	.....	3.97	Kingman.....	.....	.....	.....	2.66
Muncie.....	95	56	74.0	2.52	Kirwin.....	.....	.....	.....	3.00
Point Isabel.....	92	35	65.4	4.45	La Crosse.....	.....	.....	.....	4.88
Princeton.....	97	54	70.9	3.98	La Harpe.....	103	60	74.8	8.88
Richmond.....	96	45	70.6	4.00	Lakin.....	106	40	74.5	1.40
Rockville.....	90	43	69.6	4.06	Larned.....	108	50	78.2	5.10
Rushville.....	.....	.....	.....	5.16	Lawrence.....	99	55	73.7	6.19
Seymour.....	92	50	73.5	4.86	Lebo.....	104	54	74.6	8.72
Sunman.....	92	44	68.2	4.43	Lincoln.....	103	54	77.0	.....
Terre Haute.....	94	47	73.1	.....	Luray.....	104	50	75.7	3.40
Vevay.....	95	44	71.6	3.46	Macksville.....	104	56	74.8	5.25
Worthington.....	94	47	69.9	4.78	Manhattan (1).....	.....	.....	.....	5.93
Zionsville.....	90	53	70.2	.....	Manhattan (2).....	102	50	74.3	6.73
<i>Indian Territory.</i>					Manhattan (3).....	104	55	73.8	6.04
Eufaula.....	.....	.....	.....	9.25	Mankato.....	105	49	70.7	3.92
Fort Gibson.....	102	56	80.0	7.52	Marmaton.....	103	62	78.0	9.33
Fort Reno.....	104	58	79.6	3.21	McAllaster.....	98	55	.....	1.30
Fort Sill.....	103	61	81.3	3.00	McPherson.....	.....	.....	.....	4.05
Fort Supply.....	105	53	78.8	3.33	Minneapolis.....	101	50	74.4	7.72
Guthrie.....	108	66	81.4	5.73	Monument.....	100	54	.....	0.26
Healdton.....	100d	62d	82.6d	3.58	Morse.....	101	54	73.9	7.15
Tulsa.....	.....	.....	.....	9.30	Ness City.....	.....	.....	.....	3.90
<i>Iowa.</i>					Norton.....	103	47	74.2	1.76
Afton.....	93	54	67.9	5.00	Oakley.....	112	64	.....	0.75
Alta (1).....	95	42	67.6	4.16	Oberlin.....	.....	.....	.....	1.65
Amana.....	100	45	68.0	3.83	Offerle.....	102	52	78.9	4.68
Ames.....	100	52	68.5	4.55	Ogallah.....	105	50	73.2	3.40
Atlantic.....	99	36	67.4	3.22	Oswego.....	107	57	77.7	8.12
Bancroft.....	91	46	66.3	1.49	Page City.....	105	55	80.4	.....
Belle Plaine.....	102	46	67.1	3.78	Peabody.....	.....	.....	.....	6.58
Blakeville.....	102	50	68.8	3.43	Quenemo.....	108	51	75.6	2.26
Carroll.....	94	40	65.8	2.18	Quinter.....	109	52	.....	1.00
Carson.....	100	45	70.6	1.80	Rome.....	108	60	79.4	4.51
Cedar Rapids.....	96	47	70.0	4.27	Salina.....	99	59	76.5	4.77
Clarinda.....	100	51	71.1	4.94	Sedan.....	107	60	78.2	3.76
Cresco.....	97	42	63.9	2.79	Sharon Springs.....	104	60	76.2	1.50
Des Moines.....	101	45	70.0	.....	Shields.....	104	52	78.2	2.30
Eagle Grove.....	98	45	69.4	4.85	Tribunet.....	104	50	73.9	0.60
Fayette.....	98	37	65.2	3.45	Vesper.....	.....	.....	.....	10.80
Fort Madison.....	99	55	73.0	2.37	Wakarusa.....	105	.....	.....	8.22

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean.			Max.	Min.	Mean.	
Kansas—Cont'd.					Massachusetts—Con.				
Wa. Keeney.....	104	58	76.5	2.75	Amherst Ex Sta (2).....	88	42	67.2	4.88
Wallace.....	104	58	76.5	0.83	Andover.....	87	45	67.3	3.10
Wellington.....	109	58	79.2	2.90	Blue Hill (sum'4).....	87	45	65.9	3.05
Weskan.....	112	58	74.2	0.50	Blue Hill (base).....	87	47	67.2	3.05
Winona.....	107	56	76.0	0.10	Blue Hill (valley).....	89	43	65.7	2.82
Yates Centre.....				6.38	Boston.....	89	50	68.9	2.70
Kentucky.					Brewster.....	86	51	69.0	2.83
Bowling Green f.....				7.99	Cambridge (1).....	91	48	67.9	2.86
Burnside f.....				7.58	Cambridge (2).....	88	50	69.0	3.48
Caddo f.....	96	55	70.4	5.20	Chestnut Hill.....	90	48	69.0	3.37
Cattlettsburgh f.....				7.70	Chicopee.....				5.43
Canton *.....	97	55	73.1	7.26	Clinton.....	89	48	67.5	4.80
Earlington.....	96	55	74.8	5.95	Concord.....	84	50	68.2	4.98
Eddyville.....				6.72	Cotuit.....	91	38	68.2	4.98
Edmonton.....	92	50	71.6	6.39	Deerfield.....	87	52	68.6	5.67
Falmouth (1) f.....				5.18	Dudley *.....	83	52	68.4	4.80
Frankfort (1) f.....				3.22	Fall River (1) *.....				5.71
Frankfort (2) f.....	97	47	70.9	3.30	Fiskdale.....	86	52	66.0	6.07
Franklin *.....	93	60	72.8	7.64	Fitchburg (1).....	85	47	66.4	6.60
Greensburg f.....				4.71	Fitchburg (2).....	85	42	64.3	3.30
Harrodsburg f.....	99	44	71.7	7.94	Fort Warren.....	88	47	69.2	7.72
Louisville.....				7.99	Frammingham.....	87	40	66.7	3.96
Mount Sterling f.....	92	52	68.7	8.68	Gilbertville.....	86	48	67.9	6.37
Newport Barracks.....	96	49	71.8	5.62	Groton (1).....	90	44	66.6	4.48
Paducah f.....				7.12	Kendall Green.....	90	50	70.4	3.48
Pellville f.....	101	49	74.2	5.83	Lake Cochituate.....	90	58	68.2	4.34
Princeton f.....	100	51	74.8	5.09	Lawrence.....	94	48	69.7	5.03
Shelbyville f.....	96	45	70.8	5.34	Leominster.....	86	50	70.4	4.52
Williamsburg f.....				6.85	Lowell (1).....	87	49	68.4	4.86
Louisiana.					Lowell (2).....	88	46	67.3	4.86
Abbeville *.....	90	71	81.6	9.45	Lowell (3).....	93	51	68.4	5.91
Alexandria.....	97	65	81.8	7.08	Ludlow (1).....	94	40	65.5	5.91
Amité City.....	97	64	80.0	5.78	Ludlow (2).....	94	46	68.7	6.25
Baton Rouge.....	96	62	80.6	5.10	Lynn.....	84	49	67.0	5.62
Calhoun.....	99	60	76.5	3.30	Mansfield.....	88	44	68.6	4.79
Cameron f.....	102	65	81.2	3.60	Medford.....	84	45	67.0	3.38
Cheneyville.....	98	62	79.2	3.36	Middleborough.....	84	45	67.0	3.38
Clinton f.....	94	60	78.0	7.88	Milton *.....	88	50	65.4	4.11
Columbia.....	96	62	80.4	7.10	Monson.....	87	44	66.6	4.61
Coushatta (1) f.....				1.49	Mount Nonotuck.....				5.74
Coushatta (2) f.....	100	60	81.5	1.41	Mystic Lake.....				3.72
Crowley.....	92	68	79.9	2.70	Mystic Station.....				3.36
Delhi f.....				6.39	Nahant.....	87	51	66.8	3.35
Edgard.....	91	70	80.2	7.10	New Bedford (1).....	80	53	66.5	3.82
Emile.....	91	68	79.9	6.24	New Bedford (2).....	82	50	67.6	3.75
Farmerville.....	95	64	80.0	4.10	Newburyport (1).....	89	47	66.8	4.83
Girard f.....	94	52	75.0	3.17	Newburyport (2).....				3.14
Grand Cave f.....	94	67	80.4	2.00	Northampton.....	91	45	70.5	5.86
Grand Coteau.....	92	67	79.5	5.39	North Billerica.....	93	48	68.4	5.66
Hammond.....	94	67	80.2	5.00	Plymouth.....	86	53	69.1	5.01
Homer.....	93	65	80.3	4.59	Princeton.....	84	45	65.1	3.90
Houma f.....	92	70	79.4	8.34	Provincetown.....	84	54	68.8	2.81
Jackson Barracks.....	94	69	80.6	4.99	Roberts' Dam.....				4.43
Jeanerette.....	97	68	81.3	7.90	Royalston *.....	86	52	67.3	10.75
La Fayette f.....	96	66	81.0	5.38	Salem (1).....	88	55	67.1	3.56
Lake Charles.....	99	69	76.4	5.55	Salem (2).....	93	50	71.8	3.45
Liberty Hill.....	99	59	81.0	2.22	Somerset *.....				3.45
Luling.....	91	61	77.3	3.05	South Hingham.....				3.48
Mandeville.....	99	68	83.6	8.07	Springfield Arm'y.....	88	48	70.1	5.59
Marksville *.....	96	65	79.0	4.33	Taunton (1) f.....	88	47	69.3	4.02
Maurepas.....	91	68	78.8	4.10	Taunton (2).....	88	47	67.4	4.03
Meville f.....	94	66	80.6	5.50	Wakefield.....	88	46	66.5	4.21
Minden.....	96	69	81.1	1.17	Waltham.....				3.66
Monroe f.....	95	61	79.4	1.50	Wellesley.....	92	47	68.5	2.69
Natchitoches.....	96	61	80.3	3.01	Westborough *.....	92	48	70.6	3.53
New Iberia.....	93	69	81.2	6.73	Winchester.....				3.56
N. La. Ex. Station.....	89	60	76.5	1.53	Winchester (1) *.....	87	50	67.4	6.76
Paincourtville.....	95	66	81.2	10.68	Michigan.				
Plaquemine.....	96	62	79.0	10.79	Adrian.....	103	40	67.0	5.01
Port Eads.....	90	71	82.0	6.81	Albion (1).....	95	44	66.8	4.06
Shell Beach.....	92	69	80.4	5.33	Albion (2).....	96	35	65.8	2.55
Sugar Ex. Station.....	92	67	79.4	7.75	Alma.....	94	35	64.6	2.17
Thibodaux.....				6.15	Ann Arbor.....	93	43	66.5	4.86
West End.....				5.10	Arbela f.....				2.80
Winnabow.....	94	56	77.8	3.24	Atlantic *.....	76	45	56.9	1.38
Maine.					Ball Mountain.....	94	42	63.7	6.01
Bar Harbor.....	86	49	65.9	3.93	Bangor.....	104	37	66.3	1.94
Belfast *.....	84	36	63.6	7.90	Bear Lake.....	89	33	60.7	2.89
Calais.....	90	45	65.2	4.12	Bellaire.....	90	34	61.6	2.92
Cornish.....	92	50	67.4	3.57	Bell Branch *.....	86	32	63.5	4.35
Fairfield.....	92	41	65.6	3.05	Benton Harbor.....	100	42	69.2	2.48
Farmington *.....	90	50	63.2	5.18	Berlin.....	101	40	66.6	3.58
Fort Preble.....	88	47	65.4	3.39	Berrien Springs (1) *.....	99	47	66.9	2.34
Kennebec Arsenal.....	88	49	65.4	3.39	Berrien Springs (2).....				2.37
Kent's Hill.....	88	47	64.1	5.07	Birmingham.....	96	40	64.0	5.02
Lewiston.....	93	47	65.5	3.47	Bronson.....	94	42	64.8	4.59
Mayfield.....	90	44	66.2	6.40	Calumet.....	84	44	59.1	2.35
Orono f.....	90	43	64.8	4.55	Cassopolis.....	96	43	67.6	2.54
Petit Menan *.....	75	50	62.6	5.69	Caldwell.....	91	33	61.0	3.66
Sorrento.....	82	46	64.5	3.69	Charlevoix.....	87	43	62.5	3.12
West Jonesport.....	78	31	60.9	5.33	Cheboygan.....	84	35	61.4	3.88
Maryland.					Chelsea.....	96	32	65.0	2.60
Barren Creek Sp'g f.....	92	47	72.5	8.89	Clinton.....	101	39	69.4	3.59
Cumberland (1).....	92	45	69.8	7.07	Colon.....	96	42	63.9	4.47
Cumberland (2).....	98	48	73.4	5.53	Columbiaville.....	94	44	67.4	1.89
Fallston.....				4.97	Concord.....	97	38	65.2	2.70
Fort McHenry.....	93	48	71.8	5.65	Crawford.....	94	38	63.7	2.46
Frederick.....	94	50	73.2	7.45	Crystal Falls.....	84	31	57.5	4.82
Gaithersburg *.....				6.00	Detroit.....	95	42	70.0	5.10
Jewell.....	61	75.2	4.45		Eden.....	96	40	66.0	2.15
McDonogh.....	90	53	71.1	6.51	Evart.....	85	30	60.2	2.16
Woodstock.....	91	45	71.3	7.88	Fairview.....	99	40	63.1	2.38
Massachusetts.					Fitchburg.....	97	36	64.0	3.43

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean.			Max.	Min.	Mean.	
Michigan—Cont'd.					Mississippi—Cont'd.				
Flint.....	99	38	64.5	2.96	Jackson f.....	94	60	80.0	5.87
Fort Brady.....	82	35	59.2	3.45	Kosciusko f.....	93	58	76.0	5.00
Fort Mackinac.....	77	45	59.5	3.74	Lake f.....	94	53	77.0	3.29
Fort Wayne.....	94	40	66.6	4.70	Logtown f.....	91	66	79.0	5.58
Freemont *.....	95	37	64.1	2.37	Louisville f.....	98	56	78.9	5.20
Gaylord.....	88	36	56.8	0.75	Macon (2).....	94	58	75.4	4.75
Grand Rapids.....	98	37	66.3	2.89	Moss Point f.....	94	66	81.6	7.90
Grape.....	96	44	68.2	4.70	Natchez (1).....	92	66	79.6	7.05
Grayling.....	92	31	61.0	4.14	Natchez (2) f.....	96	62	80.7	6.02
Gulliver Lake.....	80	35	60.3	3.21	Okolona f.....	98	54	78.7	5.48
Hanover.....	96	42	67.2	3.25	Palo Alto f.....	92	59	76.7	6.83
Harbor Springs.....	91	37	62.0	2.43	Pearlington f.....	91	56	79.0	5.58
Harrison.....	95	35	62.3	2.36	Port Gibson f.....	96	59	79.2	5.30
Harrisville.....	86	36	61.3	3.20	Pontotoc f.....	90	54	76.9	7.47
Hart.....	96	40	69.3	2.85	Rienzi.....	93	62	75.2	5.18
Hastings.....	94	40	66.4	4.30	Vaiden.....	101	58	79.0	10.01
Hayes.....	88	36	63.2	2.86	Washington f.....	94	63	79.6	6.28
Highland Station *.....	95	40	64.2	2.98	Water Valley *.....	99	62	78.8	4.84
Hilldale.....	90	40	66.7	2.90	Waynesboro' (1) f.....	94	61	78.4	5.12
Howell.....	99	36	65.2	2.57	Waynesboro' (2).....	94	60	79.6	4.75
Hudson.....	98	36	62.7	4.11	West Point.....	88	66	78.0	4.09
Ionia.....	99	41	63.4	2.25	Yazoo City f.....				5.77
Ivan.....	92	33	61.4	3.55	Missouri.				
Jackson.....	100	38	64.6	4.84	Adrian f.....	102	44	70.9	5.26
Jeddo.....	88	40	66.3	2.81	Appleton City.....	102	53	75.0	5.54
Kalamazoo.....	100	42	67.2	2.81	Austin f.....	101	58	75.0	8.20
Lansing.....	95	39	65.0	3.06	Bethany.....	94	55	72.8	9.67
Lathrop.....	87	30	61.5	5.84	Boonville f.....				3.19
Madison.....	98	43	67.0	3.82	Bradleyville *.....	96	66	78.9	13.00
Mantou.....	91	33	60.7	3.66	Brunswick.....	95	53	72.0	7.10
Marshall.....	99	40	66.9	5.02	Carrollton.....	94	52	71.2	5.14
May.....	98	40	65.1	3.53	Cassville.....	96	50	73.4	8.44
Mio.....	90	35	60.2	2.92	Centerville.....				2.

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<i>Nebraska—Cont'd.</i>	o	o	o	<i>Ins.</i>	<i>New Jersey—Cont'd.</i>	o	o	o	<i>Ins.</i>
Grand Island.....	84	54	64.9	2.72	Egg Harbor City.....	96	44	71.0	4.06
Harvard.....	102	58	75.9	2.96	Freehold.....	89	46	70.6	3.68
Hay Springs.....	98	43	68.3	1.27	Gillette.....	91	45	70.0	5.46
Hebron.....	97	49	72.5	2.62	Highland Park.....	88	48	70.9	5.36
Howe.....	97	49	74.3	2.79	Hopewell.....	92	45	70.4	4.62
Imperial.....	108	68	88.0	2.25	Imlaystown.....	92	45	70.4	3.36
Kennedy *.....	100	48	69.5	1.52	Junction.....	92	45	70.4	5.04
Kimball.....	103	41	70.4	2.05	Lambertville.....	86	52	70.4	4.99
Lexington.....	103	52	74.4	1.50	Locktown.....	91	45	71.0	5.04
Lincoln.....	99	47	71.2	1.84	Madison.....	92	45	71.0	4.51
Long Pine.....	100	40	72.7	2.60	Moorestown.....	92	52	70.9	5.49
Marquette (1).....	104	45	72.1	1.92	Newark (1).....	88	50	71.7	5.20
Minden.....	108	52	72.1	1.33	Newark (2).....	92	45	71.0	5.51
Nebraska City.....	98	48	70.0	4.02	New Brunswick (1).....	92	45	71.0	5.55
North Loup.....	105	40	70.3	2.86	New Brunswick (2).....	87	49	70.7	6.20
O'Neill.....	100	46	70.0	3.17	New Brunswick (3).....	88	48	70.4	5.04
Palmer.....	100	52	72.5	0.80	Newton.....	87	40	68.5	5.38
Paxton.....	100	52	72.5	0.80	Ocean City.....	87	40	73.2	3.50
Plattsmouth.....	104	40	70.4	1.98	Oceanic.....	89	51	72.9	6.77
Ravenna.....	104	40	70.4	1.98	Rancocas.....	92	51	72.9	4.62
Sargent.....	100	52	72.6	2.83	Readington.....	90	54	74.0	4.04
Syracuse.....	100	52	72.6	2.83	South Orange.....	89	48	69.5	4.43
Tecumseh.....	95	46	70.8	1.76	Tenafly.....	91	43	70.0	4.23
Tekamah.....	97	55	72.9	2.96	Trenton.....	93	51	76.0	4.57
Theford.....	102	55	75.3	2.02	Woodbury.....	94	50	73.6	2.89
Weeping Water.....	102	45	68.7	5.36	<i>New Mexico.</i>				
West Hill.....	100	49	70.0	2.41	Albuquerque.....	94	57	75.0	0.61
West Point.....	95	61	72.1	2.50	Chama.....	94	57	66.8	2.05
Wilcox.....	108	43	74.7	1.37	Coolidge.....	92	31	64.7	0.59
<i>Nebraska.</i>					Deming.....	98	65	82.2	2.20
Austin.....	87	48	66.4	1.16	Embudo.....	92	48	67.7	3.86
Battle Mountain.....	95	60	75.3	0.90	Fort Bayard.....	87	48	67.7	3.86
Belmont.....	90	48	65.3	0.94	Fort Marcy.....	89	43	67.4	1.59
Beowawe.....	99	56	75.5	0.44	Fort Selden.....	106	60	79.6	2.63
Browns.....	102	66	83.2	0.00	Fort Stanton.....	90	48	67.0	4.43
Candelaria.....	90	51	70.3	1.19	Fort Union.....	94	43	67.2	2.41
Carlisle.....	101	43	69.9	0.10	Fort Wingate.....	95	45	70.0	2.29
Carson City.....	94	38	68.1	1.33	Gallinas Spring.....	92	60	75.6	1.08
Columbus Marsh.....	104	46	74.7	3.44	Hillsborough.....	91	57	72.9	3.61
Crane's Ranch.....	90	44	73.5	0.57	Lordsburg.....	96	68	78.6	3.69
Downeyville.....	99	44	73.5	0.57	Los Lunas.....	98	54	75.6	1.16
El Dorado Canyon.....	110	74	91.4	1.20	Nogal.....	92	43	66.8	4.16
Elko (1).....	95	52	71.6	0.00	Red Canon.....	94	53	72.8	2.27
Elko (2).....	103	28	66.4	0.00	Roswell.....	84	62	70.8	4.89
Ely.....	94	34	63.0	1.26	Springer.....	90	43	67.0	0.90
Farwell.....	105	60	82.7	0.00	Taos.....	90	43	67.0	2.64
Genoa.....	88	45	65.6	0.15	Tequesquite.....	90	62	76.5	3.06
Golconda.....	106	62	73.8	0.00	<i>New York.</i>				
Gold Mountain.....	90	55	72.4	1.04	Addison.....	90	43	66.6	6.46
Halleck.....	94	48	69.8	0.16	Afton.....	90	43	66.6	6.46
Hawthorne (1).....	99	70	80.6	1.03	Akron.....	90	43	66.6	5.97
Hot Springs (2).....	99	60	74.9	0.00	Alabama.....	95	43	64.5	4.53
Humboldt (1).....	92	50	66.6	0.00	Albion.....	89	43	62.2	6.17
Humboldt (2).....	94	50	64.1	0.45	Alfred Centre.....	89	43	62.2	6.17
Lewers Ranch.....	92	46	67.9	1.42	Angelica.....	90	38	61.8	6.72
Mill City.....	104	58	77.6	0.40	Arcade (1).....	91	42	61.9	3.86
Palisade.....	98	43	70.6	0.35	Arcade (2).....	91	36	60.4	3.09
Palmetto.....	90	42	64.8	2.40	Ardenia.....	88	53	69.8	3.66
Pioche.....	102	29	64.2	2.45	Au Sable Forks.....	90	43	66.6	5.19
Punch Bowl.....	94	44	66.3	0.19	Avon.....	94	43	66.3	3.13
Reno.....	94	44	66.3	0.19	Baldwinsville.....	90	43	66.6	5.97
Sodaville.....	100	53	76.4	1.23	Batavia.....	90	43	66.6	5.97
Tecoma.....	100	50	76.0	0.60	Bethlehem Centre.....	91	41	66.4	5.48
Toano.....	96	52	71.9	0.70	Binghamton.....	91	41	66.4	5.48
Tuscarora.....	98	36	63.8	1.90	Blood's Depot.....	92	52	70.4	4.70
Tybo.....	94	44	67.0	0.42	Boyd's Corners.....	92	52	70.4	4.70
Verdi.....	98	46	64.1	0.10	Brookport.....	94	47	70.3	2.99
Virginia City.....	102	56	77.4	0.20	Brookfield.....	89	38	62.5	6.94
Wadsworth.....	102	56	77.4	0.20	Canton.....	96	38	63.4	4.19
Wells.....	100	58	75.9	0.00	Carmel.....	91	43	70.0	4.44
Winnemucca.....	96	50	69.3	0.15	Cherry Creek.....	91	43	70.0	4.44
Yount's Ranch.....	96	61	80.4	1.30	Chittanooga.....	91	43	70.0	4.44
<i>New Hampshire.</i>					Constableville.....	88	42	63.3	5.56
Antrim.....	93	32	59.9	5.48	Cooperstown.....	88	42	63.3	5.56
Belmont.....	93	32	59.9	5.48	Davids Island.....	88	47	69.4	6.27
Berlin Falls.....	93	32	59.9	5.48	De Kalb Junction.....	88	47	69.4	6.27
Berlin Mills.....	93	32	59.9	5.48	Demeter.....	88	47	69.4	6.27
Concord.....	88	46	66.1	3.56	Easton.....	95	46	67.8	5.94
East Canterbury.....	86	50	65.7	4.80	Eden.....	95	46	67.8	5.94
Hanover (1).....	88	42	64.6	7.77	Eden.....	95	46	67.8	5.94
Hanover (2).....	91	38	65.7	7.69	Factoryville.....	87	44	65.2	5.80
Lake Village.....	91	38	65.7	7.69	Fleming.....	92	43	64.9	5.05
Littleton.....	84	42	62.8	6.31	Fort Columbus.....	89	52	71.3	5.28
Manchester (1).....	88	46	66.8	4.76	Fort Hamilton.....	85	51	70.3	4.60
Manchester (2).....	87	46	66.6	4.57	Fort Niagara.....	97	50	70.3	4.34
Mine Falls.....	90	47	66.9	5.86	Fort Porter.....	86	48	66.8	3.75
Nashua.....	90	47	66.9	5.86	Fort Schuyler.....	86	49	70.4	3.49
Newton.....	88	44	66.4	4.24	Fort Wadsworth.....	94	48	72.4	5.20
North Conway.....	90	41	64.3	6.05	Geneva.....	99	43	65.9	4.35
North Sutton.....	90	41	64.3	6.05	Hammondsport.....	92	45	65.0	4.90
Pennichuck Station.....	94	38	67.2	5.60	Hess Road Station.....	92	45	65.0	4.90
Plymouth.....	92	38	65.2	6.46	Honeymead Brook.....	86	46	66.6	7.41
Stratford.....	92	38	65.2	6.46	Humphrey.....	92	46	63.8	5.31
Walpole.....	88	42	64.1	6.10	Hyndsville.....	94	33	65.7	3.91
West Milan.....	90	34	60.5	7.06	Ilion.....	92	45	66.1	4.50
Wier's Bridge.....	90	34	60.5	7.06	Italy Hill.....	91	46	66.2	4.50
Wolfborough.....	90	34	60.5	7.06	Ithaca.....	92	46	66.2	4.50
<i>New Jersey.</i>					Keene Valley.....	94	34	59.9	6.99
Allaire.....	90	43	69.0	5.61	Le Roy.....	94	34	59.9	6.99
Asbury Park.....	88	45	70.8	5.61	Liberty.....	96	42	64.7	3.32
Bellville.....	90	43	69.0	5.61	Lowville.....	90	43	66.6	5.38
Beverly.....	99	45	70.0	5.80	Lyndonville.....	94	51	66.3	3.41
Billingsport L. H.....	94	52	74.3	6.39	Lyons.....	94	51	66.3	3.41
Bridgeton.....	93	56	74.6	6.39	Lyon Mountain.....	94	51	66.3	3.41
Cape May C. H. f.....	89	48	70.7	3.52	Madison Barracks.....	100	43	66.9	0.80

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<i>New York—Cont'd.</i>	c	o	o	<i>Ins.</i>	<i>Ohio—Cont'd.</i>	o	o	o	<i>Ins.</i>
Marlborough.....	88	46	70.1	5.37	Findlay.....	97	41	67.5	2.70
Marshland.....	100	37	63.4	4.57	Fostoria.....	98	44	69.9	3.20
McLean.....	94	44	67.1	2.85	Garrettsville.....	93	36	63.3	3.92
Middleburgh.....	94	44	67.1	2.85	Georgetown.....	97	49	70.6	2.99
Middletown.....	86	45	68.3	8.34	Granville.....	94	44	67.7	4.48
Mount Morris.....	94	44	66.1	2.49	Gratiot.....	92	44	68.6	5.80
Newark Valley.....	90	45	64.6	6.12	Greenville f.....	92	45	68.6	4.60
New Lisbon.....	87	42	60.9	4.80	Hanging Rock.....	95	45	68.5	7.44
North Hammond.....	90	45	64.6	3.63	Hassan.....	92	37	60.7	1.00
Number Four f.....	87	39	60.3	6.29	Hiram.....	92	44	65.3	3.69
Ogdensburg.....	93	46	66.4	6.07	Hudson.....	96	36	65.5	3.94
Oxford.....	86	40	61.5	7.44	Jacksonborough.....	99	47	72.8	3.35
Palermo.....	94	45	65.2	1.95	Jefferson.....	94	44	64.6	6.28
Palmyra.....	97	50	67.4	3.85	Kenton.....	98	41	68.8	3.87
Peekskill.....	86	47	67.6	3.35	Leipsic.....	94	41	70.7	2.74
Pendleton Centre.....	93	42	64.2	6.49	Logan.....	100	44	68.7	7.62
Perry City.....	92	41	63.3	6.97	Lordstown.....	96	36	65.5	3.94
Pine City.....	92	41	63.3	6.97	Mansfield.....	96	36	65.5	3.94
Plattsburgh.....	87	45	64.4	6.05	Marietta (1).....	92	46	69.8	7.07
Plattsburgh B'ks.....	92	43	64.7	5.82	Marietta (2).....	92	46	69.8	7.07
Port Jervis.....	90	44	65.1	5.88	Marion.....	95	44	69.0	3.84
Potsdam.....	93	40	64.3	4.33	McConnellsville.....	95	44	69.0	7.95
Poughkeepsie.....	90	44	69.6	5.71	Napoleon.....	101	42	70.4	4.08
Quaker Street.....	89	46	64.3	3.46	New Alexandria.....	93	42	68.4	5.48
Queensbury.....	96	38	67.9	6.47	New Comerstown.....	94	40	66.3	5.76
Rome.....	92	48	66.5	5.70	North Lewisburgh.....	103	45	72.3	3.05
Scottsville.....	85	53	69.8	4.27	Oberlin.....	93	43	65.7	2.88
Setauket.....	88	43	68.7	4.88	O. S. University f.....	94	43	68.5	3.71
Sherman.....	92	37	61.8	7.41	Orangeville.....	95	36	65.4	3.90
Shoback Depot.....	92	37	61.8	7.41	Ottawa.....	99	42	71.4	2.19
South Canisteo.....	92	37	61.8	7.41	Pomeroy.....	99	42	71.4	6.36
S. E. Reservoir.....	92	37	61.8	7.41	Portsmouth (1) f.....	95	48	70.6	6.10
South Kortright.....	92	37	61.8	7.41	Portsmouth (2) f.....	95	48	70.6	6.36
Turin.....	91	47	63.5	5.40	Shiloh.....	90	46	64.4	3.95
Utica.....	95	47	68.3	4.37	Springborough f.....	96	41	67.2	4.11
Watervliet Arsenal.....	90	47	68.2	5.25	Tiffin.....	96	41	67.2	2.32
West Point.....	96	45	69.6	4.10	Upper Sandusky.....	96	43	68.2	4.15
Willetts Point.....	87	50	70.6	4.38	Vienna.....	97	41	67.7	3.84
<i>North Carolina.</i>					Wapakoneta.....	100	40	71.2	4.46
Asheville (1).....	86	47	67.9	7.00	Wauseon.....	100	41	67.7	3.48
Asheville (2).....	86	47	67.9	7.00	Waverly.....	95	50	71.5	5.66
Bryson City.....	89	50	73.4	6.09	Waynesville.....	95	52	71.8	4.07
Clear Creek.....	89	50	73.4	6.15	Westerville.....	102	47	75.3	3.76
Currituck Inlet.....	95	45	74.4	4.75	West Milton.....	98	39	66.7	4.42
Douglas f.....	95	51	76.4	5.79	Weymouth.....	98	39	66.7	5.52
Fayetteville.....	88	41	68.7	2.30	Wooster f.....	94	40	65.8	4.66
Franklin f.....	94	58	77.2	8.38	Youngstown.....	94	40	67.6	4.29
Goldsborough.....	80	40	63.8	9.01	Zanesville.....	100	45	67.8	6.13
Highlands.....	86	50	71.2	9.01	<i>Oregon.</i>				
Hot Springs.....	86	50	71.2	9.01	Albany.....	102	42	67.8	0.28
Lenoir.....	82	52	70.0	9.80	Bandon.....	74	47	56.2	0.03
Lumberton.....	94	53	76.9	6.99	East Portland.....	84	43	67.8	0.06
Marion.....	92	45	71.4	4.83	Eola.....	95	43	64.3	0.01
Mount Airy f.....	90	44	71.1	6.81	Gold Beach.....	79	50	59.0	0.00
Mount Holly f.....	92	45	71.4	6.81	Grants Pass.....	100	38	70.9	0.13
Mount Pleasant.....	91	50	72.8	8.39	Heppner f.....	95	45	68.7	0.17
Morganton.....	91	52	71.9	4.76	Lakeview.....	99	40	69.4	T.
Murphy.....	98	54	75.6	6.25	McMinnville.....	100	38	64.4	0.23
New Berne f.....	89	46	70.6	2.10	Mount Angel.....	97	42	67.8	0.00
Oak Ridge f.....	93	51	72.2	4.20	Siskiyou.....	90	45	66.8	0.00
Pittsburgh f.....	92	58	74.0	4.85	Tillamook.....	70	49	56.6	1.50
Raleigh.....	89	58	76.8	8.87	<i>Pennsylvania.</i>				
Salisbury.....	92	52	75.0	5.40	Allegheny Arsenal.....	98	43	71.4	4.71
Smithfield.....	92	52	75.0	5.40	Altoona.....	94	51	72.0	4.09
Soapstone Mount.....	88	50	73.6	3.52	Aqueduct.....	92	51	70.8	6.87
Southport.....	90	58	77.2	3.52	Bethlehem.....	89	49	72.1	5.31
Wadesborough.....	92	47	72.2	9.62	Blooming Grove.....	90	43	67.8	9.10
Washington.....	93	49	74.2	6.95	Blue Knob.....	94	44	66.0	6.00
Weldon f.....	92	49	73.7	10.72	Brookville.....	92	39	67.3	6.89
Willeyton f.....	92	49	73.7	10.72	Cannonsburgh.....	92	44	69.5	9.65
<i>North Dakota.</i>					Carlisle.....	92	43	69.8	5.44
Davenport f.....	94	35	64.0	3.25	Catawissa f.....	89	37	67.4	2.58
Fort A. Lincoln.....	105	37	68.2	0.86	Charlesville.....	90	43	67.8	7.38
Fort Buford.....	99	36	67.0	0.22	Clarion (1) f.....	95	42	70.4	4.77
Fort Pembina.....	94	30	63.1	2.39	Cotatesville f.....	95	40	64.6	6.20
Fort Totten.....	95	39	64.3	2.37	Columbus.....	91	50	68.8	6.72
Fort Yates.....	102	40	69.0	1.51	Confluence f.....	95	40	64.6	6.20
Gallatin.....	100	36	65.2	2.53	Coopersburgh.....	91	50	68.8	6.72
Kelso.....	95	32	62.3	2.06	Corry.....	95	40	64.6	6.20
Napoleon.....	101	32	64.5	1.06	Doyltestown.....	86	40	63.0	6.35
New England City.....	99	33	65.3	0.04	Dyberry.....	90	54	61.7	6.00
Steele.....	104	33	66.8	0.45	Easton.....	92	35	68.9	7.76
Wahpeton.....	99	32	68.1	2.91	Edinborough.....	90	34	61.7	7.09
Wild Rice.....	85	50	61.9	3.39	Emporium.....	92	35	68.9	7.76
<i>Ohio.</i>					F's of Neshaminy.....	92	40	63.7	4.99
Akron.....	95	43	66.8	4.83	Franklin.....	92	40	63.7	4.99
Ashland.....	92	50	68.7	5.44	Frankford Arsenal.....	95	46	73.1	2.70
Athens.....	95	43	68.5	5.60	Frederick.....	90	40	63.7	4.99
Bangorville.....	93	44	66.3	3.52	Freeport f.....	90	39	72.6	3.93
Bellevue.....	96	50	66.8	3.84	Germantown.....	90	59	72.6	3.93
Bement.....	96	43	65.8	4.23	Gettysburgh f.....	98	40	70.3	8.95
Bucyrus.....	92	42	67.5	5.97	Girardville.....	85	45	67.0	6.48
Caledonia f.....	95	42	67.5	4.55	Grampan Hills.....	94	46	66.1	6.41
Canton.....	95	42	67.5	4.55	Greensborough f.....	96	37	66.0	6.05
Carrollton.....	96	46	70.1	6.72	Hollidaysburgh.....	96	43	68.0	3.87
Celina.....	96	46	70.1	6.72	Honesdale.....	87	41	65.9	5.97
Circleville (1) f.....	98	45	69.6	4.36	Huntingdon.....	93	40	68.6	4.40
Circleville (2).....	92	45	67.0	2.69	Johnstown.....	94	44	68.8	6.38
Clarksville.....	95	44	70.0	3.38	Kennett Square.....	96	40	69.0	7.40
Cleveland.....	98	46	72.3	5.27	Lansdale.....	88	45	67.2	5.71
Columbus Barracks.....	92	45	68.4	6.40	Le Roy.....	93	42	70.8	5.78
Dayton.....	92	45	68.4	6.40	Lewisburgh.....	96	36	68.7	9.37
Demos.....	92	45	68.4	6.40	Ligonier.....	94	41	70.9	3.84
Ellsworth.....	97	43	67.6	3.91	Lock Haven.....	94	41	70.9	3.84
Elyria.....	97	43	67.6	3.91					

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean.			Max.	Min.	Mean.	
<i>Pennsylvania—Con.</i>					<i>S. Dakota—Cont'd.</i>				
Lock No. 41	92	41	70.2	7.39	Wolsey *	103	34	69.5	0.88
Lynnport	92	41	70.2	6.50	Woonsocket	104	32	68.3	0.81
Mahoning	91	45	68.4	5.59	<i>Tennessee.</i>				
Mauch Chunk	92	40	68.9	6.60	Andersonville	92	48	69.6	5.11
McConnellsbu	91	40	63.9	3.94	Arlington	93	50	71.8	9.73
Meadville (2)	92	40	69.0	5.12	Ashwood *	92	53	74.9	3.33
Myerstown	92	40	69.0	3.69	Austin *	96	55	70.1	4.70
New Castle	98	36	69.6	4.30	Bolivar (1)	85	69	75.5	4.00
Nisbet *	93	35	67.7	5.56	Bolivar (2)	92	54	75.6	12.35
Oil City	92	40	68.4	5.56	Brownsville	96	55	77.4	7.35
Ottville	92	40	68.4	5.56	Charleston	93	54	76.0	8.43
Parker's Landing	96	46	69.4	4.58	Clinton	90	61	75.0	3.31
Petersburg	96	46	69.4	4.58	Columbia	90	61	75.0	3.31
Philadelphia	94	39	76.4	4.33	Covington (1)	90	61	75.0	3.31
Phillipsburg	94	39	76.4	4.33	Covington (2)	97	53	75.3	3.86
Phoenixville	94	39	76.4	4.33	Dyersburg (1)	96	58	75.2	3.84
Point Pleasant	94	39	76.4	4.33	Dyersburg (2)	99	52	77.5	5.68
Pottstown	94	39	76.4	4.33	Fayetteville	93	57	74.6	4.17
Quakertown	90	44	68.5	5.86	Florence Station	91	58	73.7	6.28
Rimersburg	93	40	68.5	5.86	Grand Junction	93	56	76.1	4.76
Salem Corners	88	54	68.1	7.15	Greenville	85	52	69.6	7.03
Salisbury	91	47	67.4	5.07	Grief	93	54	71.8	4.50
Seisholtzville	94	39	76.4	4.33	Hohenwald	97	48	74.9	5.09
Selin's Grove	94	39	76.4	4.33	Jacksborough	87	51	71.4	5.18
Smith's Corners	93	34	65.4	7.90	Johnsonville	94	54	76.6	4.10
Somerset	88	47	67.4	7.53	Kingston (1)	94	54	76.6	5.65
South Eaton	90	44	68.5	5.46	Kingston Springs	92	57	73.1	3.20
State College	92	50	72.2	4.35	Lewisburg	92	57	73.1	4.85
Swarthmore d.	107	50	69.2	0.60	Loudon	90	54	73.0	4.33
Tipton	91	47	66.0	9.57	Lynnville	97	51	76.5	8.48
Uniontown	95	43	71.6	8.44	Milan (2)	97	51	76.5	8.48
Warren	94	40	67.1	5.45	Missionary Ridge	94	48	76.4	4.62
Waynesburg	94	40	67.1	5.45	Nunnally	94	48	76.4	4.62
Wellaborough *	90	46	71.1	5.87	Parksville	90	51	73.0	5.03
West Chester	91	41	69.0	5.44	Riddleton	92	51	71.3	7.30
Wilkes Barre	91	42	66.3	5.71	Rockwood	90	53	71.2	4.03
Wyox	93	42	71.5	5.65	Rogersville	90	53	71.2	4.03
York	93	42	71.5	5.65	Rugby	90	53	71.2	4.03
<i>Rhode Island.</i>					Sharp's	92	56	73.3	8.31
Bristol	81	50	68.4	3.87	Springdale	94	54	74.6	9.91
Fort Adams	88	46	67.8	1.76	Strawberry Plains	94	54	74.6	9.91
Kingston (1)	89	38	67.3	3.89	Trenton	92	54	73.4	8.58
Kingston (2)	84	45	67.5	4.01	Union City	96	61	77.0	5.28
Lonsdale	87	52	70.8	3.98	Watkins	99	56	74.7	7.45
Olneyville	87	52	70.8	3.98	Waynesborough	90	51	72.1	3.15
Pawtucket	90	48	69.9	3.16	<i>Texas.</i>				
Providence (2)	90	48	69.9	3.16	Austin (1)	96	71	83.6	0.34
<i>South Carolina.</i>					Austin (2)	99	71	85.5	0.34
Allendale	95	57	78.4	3.24	Brady	97	67	80.4	6.63
Batesburg	95	57	78.4	3.24	Brasoria *	91	69	79.4	4.31
Belmont	91	56	75.5	4.71	Brenham	97	68	83.5	3.05
Blackville	96	57	79.4	1.98	Brownwood	102	67	84.2	1.53
Branchville	92	56	76.5	4.31	Burnet *	92	72	83.2	2.55
Brewer Mine	95	52	74.6	5.50	Camp del Rio	103	54	78.4	1.85
Camden	95	52	74.6	5.50	Camp Eagle Pass	102	69	86.1	0.60
Cheraw	96	53	77.0	0.66	C'p Peña Colorado	98	58	82.2	3.61
Chester	95	61	78.9	1.99	Cold Water	102	54	79.4	3.32
Connors	95	57	75.7	3.31	College Station	97	68	83.8	0.75
Evergreen *	91	57	75.7	3.31	Colorado	99	64	81.4	4.02
Florence	94	58	78.2	5.12	Columbia	94	70	81.9	4.01
Greenville	90	55	74.3	6.15	Corsicana (1)	102	65	80.4	0.82
Greenwood	96	53	77.4	3.39	Corsicana (2)	100	66	82.7	1.68
Hardesville	96	50	79.0	4.47	Cuero	102	58	82.7	0.72
Jacksonborough	95	54	77.2	1.68	Dallas (2)	100	71	86.1	0.69
Kingstree	94	57	78.4	4.68	Durham	100	72	84.7	2.05
Kirkwood *	94	57	78.4	4.68	Edinburgh	100	72	84.7	2.05
McCormick	94	57	78.4	4.68	Epworth	95	61	79.9	2.25
Port Royal	94	57	78.4	4.68	Forestburg	95	61	79.9	2.25
Saint George's	94	57	78.4	4.68	Fort Brown	95	70	81.1	1.30
Saint Matthew's	94	57	78.4	4.68	Fort Clark	99	70	84.2	1.72
Simpsonville	95	58	76.4	3.31	Fort Davis	90	60	75.2	2.65
Spartanburgh (1)	99	50	76.7	5.39	Fort Elliott	100	55	78.1	2.69
Spartanburgh (2)	92	50	75.4	6.06	Fort Hancock	105	56	79.0	1.95
Statesburg	90	58	74.1	7.07	Fort McIntosh	100	69	85.3	0.10
Timmonsville	88	70	77.4	6.85	Fort Ringgold	105	70	86.2	0.38
Trial *	91	58	79.0	5.83	Fort Worth	97	60	83.6	2.89
Walhalla	86	61	75.4	4.43	Fredericksburg *	99	65	80.1	3.30
Winnaburgh	96	55	75.8	7.95	Gainesville	102	64	83.2	2.29
Yorkville	91	51	74.0	2.65	Gallinas	102	64	83.2	2.29
<i>South Dakota.</i>					Graham	102	67	84.8	1.17
Aberdeen	100	35	67.1	0.83	Grapevine	104	70	86.7	1.37
Alexandria	103	37	68.5	2.86	Hartley	98	45	74.2	4.28
Brookings	99	35	65.2	2.07	Haskell	106	70	87.4	1.77
Canton	95	39	67.8	2.46	Hearne	98	63	78.8	0.81
Clark	99	35	65.8	0.88	Houston	97	67	82.2	5.75
Cross *	96	38	67.1	1.29	Howe	99	58	78.2	1.93
De Smet	95	33	65.3	1.25	Huntsville	95	68	82.2	4.85
Flandreau	98	37	65.2	2.06	La Grange	94	74	81.8	3.78
Fort Bennett	106	41	73.1	0.71	Lampassas	99	68	83.6	2.23
Fort Meade	101	48	70.8	1.64	Longview	100	61	83.4	0.41
Fort Randall	103	42	73.2	1.94	Luling	102	68	85.2	2.04
Fort Sully	105	43	73.6	0.63	Menardville	95	69	79.5	4.21
Highmore	105	34	69.1	0.30	Mesquite	100	66	83.8	4.18
Howard	100	35	66.0	0.30	Miami	100	66	83.8	4.18
Kimball	102	39	67.1	2.21	Mountain Springs	99	64	83.0	1.43
Milbank	106	48	64.7	1.53	New Braunfels	95	68	80.4	1.58
Onida	104	40	66.2	0.27	New Ulm	100	66	82.5	3.86
Oelrichs	104	39	69.4	0.10	Orange	92	68	79.2	0.69
Saint Lawrence	101	52	71.5	0.74	Panhandle	98	50	75.6	0.92
Seranton *	102	51	69.3	0.23	Paris	99	64	82.0	3.56
Sioux Falls	98	36	66.8	3.03	Round Rock	100	72	85.2	1.16
Spaulding	96	47	72.4	1.66	San Antonio	98	70	84.1	0.00
Vermillion	96	39	66.8	2.14					
Webster	98	31	68.2	3.39					

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean.			Max.	Min.	Mean.	
<i>Texas—Cont'd.</i>					<i>Washington—Cont'd</i>				
Santa Maria.....	99	59	77.5	0.35	Fort Walla Walla.....	100	52	73.8	0.06
Silver Falls.....	99	59	77.5	1.07	Lapush.....	62	43	53.6	0.48
Tyler.....	98	64	82.8	1.60	North Yakima.....	99	46	74.4	0.04
Venus.....	100	65	82.6	1.51	Seattle.....	86	50	62.9	0.15
Waco (2).....	100	69	85.1	1.00	Vancouver B'ks.....	99	39	63.6	0.15
Weatherford.....	102	58	81.6	0.40	Vashon.....	90	49	70.8	0.15
<i>Utah.</i>					Waterville.....	96	41	68.8	T.
Beaver.....	92	38	67.8	0.44	<i>West Virginia.</i>				
Blue Creek.....	98	61	78.2	0.80	Buckhannon.....	.....	.....	.....	3.79
Fort Douglas.....	97	50	73.0	1.83	Charleston.....	.....	.....	.....	8.67
Fort DuChesne.....	99	37	69.0	0.85	Ellis.....	88	48	67.6	8.22
Grouse Creek.....	96	49	73.7	0.10	Glenville.....	.....	.....	.....	7.72
Kelton.....	96	49	73.7	0.10	Harper's Ferry.....	.....	.....	.....	5.54
Levan.....	96	49	73.7	0.10	Hinton.....	.....	.....	.....	3.49
Loosee.....	96	49	73.7	0.10	Kingwood.....	92	50	63.6	.....
Moabi.....	105	44	74.6	0.61	Mount Alto.....	.....	48	63.5	.....
Mount Carmel.....	95	47	69.3	0.94	Morgantown.....	.....	.....	.....	7.08
Mount Pleasant.....	99	36	68.6	0.42	Oceans.....	91	52	68.6	5.93
Nephi.....	99	36	68.6	0.42	Parkersburg.....	.....	.....	.....	5.84
Ogden (1).....	86	52	69.3	0.12	Pleasant Hill.....	90	42	65.1	.....
Ogden (2).....	95	62	75.9	2.30	Point Pleasant.....	.....	.....	.....	10.26
Price.....	98	48	70.3	0.00	Rowlesburg (1).....	.....	.....	.....	5.44
Promontory.....	98	48	70.3	0.00	Tannery.....	94	48	68.2	.....
Richfield.....	93	41	67.7	0.30	Tyler Creek.....	96	38	67.8	5.70
Saint George.....	108	52	82.0	0.15	Weston.....	.....	.....	.....	7.94
Snowville.....	91	.....	.....	0.09	Wheeling.....	.....	.....	.....	6.88
Terrace.....	100	55	78.2	0.00	White Sulph' Sp'gs.....	.....	.....	.....	0.92
<i>Vermont.</i>					<i>Wisconsin.</i>				
Brattleborough (1).....	90	40	69.5	8.29	Butternut.....	.....	44	55.6	5.76
Brattleborough (2).....	88	44	66.3	.....	Cadia.....	.....	42	65.8	9.18
Burlington.....	90	50	70.0	6.76	Chippewa Falls.....	.....	.....	.....	4.05
Chelsea.....	83	45	61.4	7.20	Embarrass.....	86	50	64.0	7.05
Cornwall.....	92	34	63.9	6.00	Fond du Lac.....	97	36	63.8	2.89
East Berkshire.....	92	34	63.9	9.83	Glasgow.....	97	36	64.5	4.58
Hartland.....	88	40	66.2	6.76	Grantsburg.....	84	38	60.6	7.54
Jacksonville.....	88	36	62.6	6.26	Greenwood.....	99	30	61.8	3.55
Lanesburgh.....	90	48	67.2	6.14	Honey Creek.....	99	40	66.0	2.40
Manchester.....	90	49	66.0	4.66	Ithaca.....	820	418	64.0	3.46
Stratford.....	88	46	66.8	8.85	Lincoln.....	.....	53	62.8	3.74
Vernon.....	88	46	66.8	6.46	Madison.....	93	46	66.0	4.23
Weatherfield C'tre.....	89	45	63.4	.....	Manitowoc.....	90	40	65.2	2.23
<i>Virginia.</i>					Medford.....	.....	.....	.....	6.17
Abingdon.....	.....	.....	.....	5.49	Neillsville.....	94	34	60.2	.....
Birdsnest.....	91	61	75.3	4.05	Oshkosh.....	94	44	65.6	5.04
Bolar.....	87	40	64.0	2.99	Phillips.....	.....	.....	.....	9.88
Casanova.....	97	50	75.3	5.32	Plover.....	94	36	62.2	10.91
Christiansburg.....	90	43	69.6	3.78	Portage.....	.....	.....	.....	3.89
Dale Enterprise.....	94	35	67.1	1.26	Potosi.....	98	50	69.2	6.57
Fall Creek Depot.....	90	58	74.5	4.84	Summit Lake.....	90	40	64.0	7.30
Fort Monroe.....	92	56	76.0	0.79	Wancousta.....	.....	34	59.8	.....
Fort Myer.....	96	45	71.9	5.36	Wauseka.....	.....	54	59.4	.....
Lexington.....	95	39	70.4	2.04	<i>Wyoming.</i>				
Marion.....	87	43	68.8	3.40	Camp Pilot Butte.....	92	32	63.4	0.61
Mossingford.....	.....	61	73.4	3.75	Camp Sheridan.....	88	36	60.6	1.77
Nottaway C. H.....	95	44	74.6	3.33	Fort Bridger.....	80	34	62.1	0.44
Petersburg.....	94	48	75.8	3.85	Fort D. A. Russell.....	104	31	65.0	2.44
Richmond.....	95	49	75.8	3.26	Fort McKinney.....	92	44	67.9	1.08
Smithfield.....	88	54	72.2	5.37	Fort Washakie.....	93	39	67.7	0.77
Staunton.....	96	45	70.9	1.62	Lusk.....	94	40	65.6	0.89
Summit.....	92	42	70.3	.....	Owen.....	92	35	62.3	0.90
Woodstock.....	.....	.....	.....	3.71	Saratoga.....	90	47	62.5	1.53
Wytheville.....	85	46	68.9	4.55	<i>British Columbia.</i>				
Yancy's Mills.....	94	40	72.8	1.45	New Westminster.....	79	50	64.2	2.53
<i>Washington.</i>					<i>New Foundland.</i>				
Blakeley.....	84	45	62.4	0.26	Saint John's.....	80	44	68.1	3.29
Chehalis.....	95	40	64.1	0.84	<i>Mexico.</i>				
Doe Bay.....	76	47	57.7	0.25	Leon de Aldemas.....	83	55	68.7	5.36
East Sound.....	78	46	62.5	0.31	Masatlan.....	90	75	82.9	7.62
Fort Canby.....	89	50	59.9	1.22	Mexico.....	76	51	62.9	2.59
Fort Simcoe.....	97	58	76.9	0.90	Pueblo.....	81	50	64.6	0.02
Fort Spokane.....	99	44	69.1	0.20	Zacatecas.....	78	46	60.8	1.96
Fort Townsend.....	84	47	61.0	0.30					

Reports received too late, etc.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<i>Oregon—Cont'd.</i>				<i>Ins.</i>	<i>Tennessee.</i>				<i>Ins.</i>
Jacksonville.....	92	47	68.4	0.50	Cumberland Gap... 82	50	69.0	0.01	
LaGrande.....	93	43	68.6	0.27	<i>Texas.</i>				
North Powder.....	90	33	60.8	0.22	Belton.....	99	62	84.3	0.42
Pendleton.....	99	44	68.8	0.07	Childress.....	103	67	84.6	4.33
Telocaset.....	.....	.....	.....	0.37	Fort Bliss.....	101	60	80.8	4.50
The Dalles.....	94	47	69.5	0.04	Merkel.....	70	82.0	2.15	
Vernonia.....	97	43	61.5	0.33	Ochiltree.....	104	56	84.0	3.19
Weston.....	97	44	69.4	0.23	Panther.....	105d	72d	86.4d	2.02
<i>Pennsylvania.</i>					<i>Wyoming.</i>				
Drifton.....	88	42	64.8	5.30	Fort Fetterman....	105	29	65.9	0.00
Eagle's Mere.....	82	41	64.0	7.28	<i>Mexico.</i>				
Lewistown.....	93	43	72.2	5.27	La Logia.....	98	80	86.6	3.37

Reports received too late for publication in July, 1890.

<i>Alabama.</i>					<i>Massachusetts—Con.</i>				
Fort Deposit.....	100	68	81.5	4.10	Lynn.....	91	49	68.4	1.60
<i>Alaska.</i>					Mystic Station.....	.....	.....	.....	2.19
Killisnoo.....	71	42	56.4	6.02	<i>Montana.</i>				
<i>Arizona.</i>					Powder River.....	107	44	74.4	0.40
Crittenden.....	.....	.....	.....	6.00	Shelden.....	102	50	69.0	.....
San Simon.....	110	60	86.4	1.67	<i>Nevada.</i>				
Texas Hill.....	119	80	97.7	.....	Carlin.....	110	56	78.1	0.00
<i>California.</i>					<i>New York.</i>				
Elmira.....	110	60	77.1	0.00	Carmel.....	92	45	71.0	5.05
Fresno.....	112	65	85.0	0.00	Rondout.....	100	36	73.0	1.84
Galt.....	110	58	79.3	0.00	S. E. Reservoir.....	.....	.....	.....	5.08
Hydesville.....	72	45	56.8	0.15	<i>North Carolina.</i>				
Julian.....	96	57	74.6	.....	Clear Creek.....	97	52	76.4	6.15
Livermore.....	102	50	69.9	0.00	Douglas.....	98	54	77.2	11.65
Long Beach.....	80	62	69.9	0.00	Fayetteville.....	100	54	79.4	7.52
Mount Hamilton.....	90	49	67.4	0.00	Franklin.....	90	49	71.2	5.30
Porterville.....	110	69	89.7	0.00	Highlands.....	82	50	66.4	14.48
Pleasanton.....	105	51	70.7	0.00	Marion.....	97	48	73.8	8.26
San Gabriel.....	102	65	79.2	0.00	Morganton.....	94	60	74.2	6.55
Santa Maria.....	85t	45t	62.8t	0.06	Mount Airy.....	95	47	74.6	8.75
Tracy.....	110	62	81.2	0.00	Pittsborough.....	93	52	75.4	5.05
Williams.....	109	63	81.0	0.00	Raleigh.....	95	58	79.0	11.30
Winters.....	110	58	85.7	0.00	Salisbury.....	93	64	79.6	6.06
<i>Colorado.</i>					Smithfield.....	96	55	77.2	10.05
Beaver Creek.....	.....	.....	.....	T.	Wileyton.....	99	51	75.4	7.55
Hardin.....	.....	.....	.....	1.12	Washington.....	95	55	78.4	7.66
Laird.....	.....	.....	.....	1.00	<i>South Dakota.</i>				
Lay.....	.....	.....	.....	0.40	Parkston.....	95	45	71.2	2.30
Platoro.....	.....	.....	.....	5.88	<i>Texas.</i>				
Rifle Falls.....	89	55	67.0	0.08	Durham.....	.....	.....	.....	0.53
T. S. Ranch.....	99	54	77.4	0.82	<i>Utah.</i>				
<i>Connecticut.</i>					Ogden (1).....	94	45	72.1	0.40
Southington.....	92	46	69.4	2.91	<i>Virginia.</i>				
<i>Illinois.</i>					Casanova.....	97	54	75.2	2.79
Aurora (2).....	.....	.....	.....	1.04	Marion.....	94	50	72.6	4.94
Palestine.....	97	50	74.7	2.35	<i>Washington.</i>				
<i>Indiana.</i>					Lapush.....	68	45	54.0	2.81
Vincennes.....	.....	.....	.....	1.47	<i>West Virginia.</i>				
<i>Kansas.</i>					Morgantown.....	.....	.....	.....	3.41
Emporia.....	98	57	81.6	1.89	<i>Wisconsin.</i>				
Frankfort (1).....	.....	.....	.....	4.50	Grantsburgh.....	95	40	68.3	6.17
<i>Louisiana.</i>					Waucoasta.....	.....	44	67.4	.....
Grand Coteau.....	93	66	81.4	5.55	<i>Sandwich Islands.</i>				
<i>Massachusetts.</i>					Honolulu.....	86	68	77.2	2.77
Fall River (2).....	92	50	70.6	2.19	Colony Surinam, S.A.	.....	.....	.....	.....
					Burnside-Corone..	91	70	78.0	5.29

Letters of the alphabet denote the number of days missing from the record, thus: the letter c indicates three days missing, etc., etc.

*Extremes of temperature from observed readings. †Signal Service instruments.

‡One observation daily at 10 a. m. §Probably 1.60. ¶Probably too low.

Corrections: Emporia, Kans., August, 1890, total precipitation should be 8.17, instead of 6.55; Franklin, N. C., August, 1890, make total precipitation blank, instead of 2.30; page 189, July, 1890, strike out Mount Hamilton, Cal.; page 193, July, 1890, strike out Ravenna, Cal.; Stamford, Colo., June, 1890, total precipitation should be 0.37, instead of 0.07; page 140, May, 1890, strike out Waucoasta, Wis., minimum temperature, 32, mean temperature, 51.3; Fort Bidwell, Cal., May, 1890, minimum temperature should be 32 instead of 72.

Mean temperature (degrees Fahr.) observed at Fort Davis, Tex., by Signal Service observers and U. S. Army surgeons.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1878.....	.....	.....	.....	65.3	71.7	76.3	75.5	75.8	70.0	66.3	55.1	39.1	.....
1879.....	49.7	51.9	59.7	62.8	73.4	72.9	77.0	69.8	67.7	58.4	51.0	50.0	62.0
1880.....	49.3	45.6	53.6	61.4	70.1	73.6	70.1	67.0	63.1	56.1	42.0	43.3	58.0
1881.....	36.4	46.7	52.1	61.6	65.8	78.6	79.7	73.1	[70.3]	63.0	[51.2]	45.2	[60.3]
1882.....	45.2	49.2	54.8	59.4	66.7	74.5	75.3	68.6	64.9	61.3	49.6	41.9	59.3
1883.....	42.0	45.9	53.6	58.2	68.3	75.8	73.8	72.9	67.0	62.7	51.6	46.7	59.6
1884.....	39.3	51.6	54.5	55.5	64.1	72.0	79.4	73.2	69.3	59.6	50.2	45.9	59.6
1885.....	40.8	47.9	51.8	61.6	64.5	75.1	73.3	73.0	68.1	59.9	54.9	48.6	59.9
1886.....	42.8	47.3	52.6	59.8	72.8	73.6	76.1	75.5	68.4	63.3	49.4	49.9	61.0
1887.....	46.2	51.9	55.7	61.3	69.0	73.7	75.4	74.6	68.3	57.7	52.3	40.0	60.5
1888.....	45.0	48.2	50.1	61.5	66.8	76.1	75.0	73.6	66.6	61.4	49.4	46.6	60.0
1889.....	39.2	45.8	50.1	63.6	68.9	72.6	75.8	77.2	65.5	69.2	49.5	56.5	61.2
1890.....	51.0	52.6	63.2	70.9	74.3	73.8	76.3	75.2	.....	.....	.....	.....	.....
Mean.....	43.9	48.7	54.3	61.8	69.0	74.5	75.6	73.0	67.4	61.6	50.5	46.1	60.5

Interpolated values are given in brackets.

Mean temperature (degrees Fahr.) observed at Muscatine, Iowa, by Prof. T. S. Parvin, Rev. John Ufford, and J. P. Walton, Signal Service, voluntary, and Smithsonian observers.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1839...	32.2	31.8	40.5	62.7	68.9	70.6	75.7	73.1	61.1	60.7	35.1	23.9	53.0
1840...	19.5	28.2	38.3	52.9	63.1	72.4	73.9	72.1	63.1	52.6	41.9	29.6	50.6
1841...	20.9	26.1	37.1	51.0	58.1	71.1	70.4	65.5	58.5	55.0	38.2	28.8	48.4
1842...	26.3	28.1	45.8	53.3	57.9	65.6	68.4	68.7	64.5	55.5	30.2	21.6	48.8
1843...	25.0	13.4	15.5	47.7	58.2	67.8	70.4	70.6	64.6	42.2	34.1	31.9	45.1
1844...	22.7	30.3	38.3	60.8	55.9	65.8	74.9	70.0	61.4	46.1	36.1	25.3	49.0
1845...	30.0	29.9	40.4	55.1	55.5	64.3	76.0	70.8	62.9	48.5	33.3	18.2	48.7
1846...	31.2	24.2	40.6	52.7	64.1	66.1	73.0	72.0	65.9	43.0	39.1	28.9	50.1
1847...	12.3	25.3	29.4	49.1	55.8	62.5	69.5	65.3	59.8	47.8	33.5	25.4	44.6
1848...	28.0	28.4	35.2	45.1	62.0	64.3	64.0	66.7	63.3	43.9	30.8	19.1	45.3
1849...	14.3	18.1	37.6	44.3	54.8	67.6	66.5	65.3	61.7	49.0	42.9	18.4	45.0
1850...	24.4	28.9	32.6	41.2	53.3	70.2	74.2	72.2	59.8	44.2	37.6	19.8	46.5
1851...	24.0	27.7	38.2	43.5	58.2	64.6	71.6	69.1	68.3	50.4	34.5	21.4	47.6
1852...	19.6	29.0	36.2	42.2	60.0	66.8	72.4	69.0	59.8	53.2	30.0	22.4	46.7
1853...	27.1	23.4	33.2	47.8	55.7	71.2	68.8	71.1	62.2	45.5	39.7	26.7	47.7
1854...	16.2	28.5	39.9	51.1	60.0	69.0	76.2	73.0	68.2	44.4	36.8	27.8	49.3
1855...	24.8	15.6	30.3	54.0	60.4	67.0	73.0	70.4	67.9	47.2	37.8	21.7	47.5
1856...	7.5	15.0	25.8	49.5	61.4	71.8	73.5	65.4	59.9	52.4	32.8	15.6	44.1
1857...	6.2	28.8	29.9	38.3	53.9	65.1	71.2	70.9	63.8	47.9	31.2	31.4	44.9
1858...	30.0	16.0	38.7	46.1	54.3	70.6	78.8	79.9	65.9	52.0	32.6	25.5	45.3
1859...	24.1	25.8	40.1	43.3	62.1	69.0	72.3	68.2	60.3	47.5	39.6	15.1	47.3
1860...	21.3	26.6	42.7	49.6	64.3	69.3	71.7	68.8	54.2	61.3	35.7	17.5	48.6
1861...	16.0	27.1	35.6	52.7	58.0	72.0	73.5	75.4	65.2	54.5	39.4	32.5	50.2
1862...	15.3	16.3	34.5	47.0	61.8	67.0	76.8	75.2	68.3	54.7	38.8	33.7	49.1
1863...	30.3	27.0	31.8	51.3	64.0	69.0	71.4	73.6	62.4	45.4	35.3	26.8	49.2
1864...	17.4	26.7	33.2	44.7	50.9	71.3	75.3	70.6	64.0	46.6	33.4	19.6	46.6
1865...	18.4	29.6	33.7	44.1	57.1	72.2	69.2	70.2	70.8	50.4	38.5	20.7	47.9
1866...	19.3	17.6	26.7	52.3	59.3	67.5	76.8	68.7	57.9	51.2	37.4	24.2	46.6
1867...	16.0	25.5	26.7	47.4	53.7	72.4	73.1	73.4	62.5	51.9	39.8	25.7	47.3
1868...	13.3	21.1	41.3	43.6	60.4	70.8	82.1	66.1	57.0	48.8	38.0	21.3	47.0
1869...	20.3	29.8	46.2	40.2	59.7	64.4	70.4	73.3	69.9	42.5	32.6	25.8	48.9
1870...	21.4	25.3	30.6	52.7	64.3	71.5	73.0	70.2	66.5	52.2	39.9	23.8	49.3
1871...	20.6	29.4	40.1	51.1	64.5	68.3	71.5	72.8	60.3	52.9	32.4	17.6	48.5
1872...	20.5	27.0	26.5	49.3	60.8	69.5	73.3	73.0	60.8	48.3	29.1	14.5	46.0
1873...	13.3	19.5	33.9	45.6	59.6	71.2	72.1	73.5	56.6	45.8	31.8	29.9	46.4
1874...	20.7	26.6	33.2	39.5	62.0	73.1	75.5	74.8	64.2	51.1	34.3	25.3	48.4
1875...	8.5	9.7	30.9	45.3	60.3	67.6	71.0	69.7	59.7	46.5	30.4	32.4	44.4
1876...	28.4	29.1	30.4	49.0	60.4	67.2	72.4	69.7	61.3	47.2	32.8	13.9	46.8
1877...	15.3	33.7	27.1	48.0	64.8	66.7	72.6	70.0	64.3	50.6	34.6	40.2	48.9
1878...	27.6	32.5	46.3	54.9	57.0	69.5	75.0	74.8	63.9	50.5	39.7	18.3	50.9
1879...	17.7	23.4	36.4	48.8	63.0	68.7	75.3	70.0	58.8	58.9	38.2	20.4	48.4
1880...	35.1	30.0	35.1	48.6	65.1	71.1	75.2	72.8	60.6	48.7	27.4	18.6	49.0
1881...	11.1	20.1	28.0	42.7	66.6	69.1	75.2	76.7	69.6	54.0	35.1	35.0	48.6
1882...	23.6	36.4	41.2	49.5	55.0	69.3	69.6	69.6	62.7	58.8	38.7	23.3	49.8
1883...	9.7	19.0	31.4	50.3	56.2	67.2	69.0	68.3	57.3	47.7	38.0	25.5	45.5
1884...	10.4	21.1	32.6	46.9	57.8	66.7	69.8	66.9	67.3	55.8	35.8	19.3	45.9
1885...	11.1	10.4	31.0	47.6	66.9	68.2	76.5	68.8	65.0	47.6	37.1	19.6	45.8
1886...	14.2	21.2	32.4	50.3	61.2	66.2	77.2	75.4	66.4	65.6	33.7	10.6	47.9
1887...	12.5	23.4	34.4	50.8	65.0	71.8	78.4	71.8	50.4	47.7	36.4	24.2	47.2
1888...	9.6	20.9	30.6	50.8	55.0	63.2	74.2	70.7	59.2	48.5	38.5	31.2	46.0
1889...	25.8	21.4	40.2	50.5	59.6	66.9	73.0	70.0	62.0	49.1	36.7	39.6	49.6
1890...	[26.5]	31.5	[41.5]	52.2	58.8	73.8	.....	.....	.....	.....	.....	.....	.....
Mean...	20.1	24.7	34.8	48.9	59.9	68.6	73.0	70.8	62.5	50.3	35.7	24.1	47.8

Precipitation (inches and hundredths) observed at Muscatine, Iowa, by J. P. Walton, Rev. J. Ufford, S. Foster, and Prof. T. S. Parvin, voluntary, and Smithsonian observers.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1846	2.80	4.50	2.10	5.40	3.40	4.20	1.30	0.50	5.50	1.30	1.60	1.75	34.55
1847	0.79	1.11	2.94	5.40	3.50	4.60	1.20	3.30	2.10	1.21	3.45	1.00	28.50
1848	1.20	1.61	2.31	0.70	3.40	2.50	5.70	9.10	3.00	4.30	1.85	3.95	39.62
1849	3.15	1.03	2.51	4.70	4.70	12.20	1.40	12.20	5.00	4.80	6.60	0.87	59.16
1850	4.62	0.80	2.08	3.32	3.70	3.50	5.00	13.00	3.90	2.70	3.59	2.87	49.08
1851	1.55	5.34	3.03	3.60	12.60	14.30	8.60	14.00	3.50	1.40	3.63	2.95	74.50
1852	2.52	1.00	8.66	5.30	6.50	2.20	3.70	2.80	8.30	7.60	5.76	5.11	79.50
1853	0.40	0.90	0.90	11.80	4.60	6.40	6.60	1.70	6.20	2.00	4.90	0.32	44.92
1854	0.40	1.80	1.23	1.76	6.21	0.66	2.22	3.33	1.13	4.22	0.19	0.51	23.66
1855	3.25	0.71	1.87	2.55	1.94	4.75	2.35	3.51	1.84	2.81	2.23	3.32	31.13
1856	1.22	5.54	0.61	3.44	4.39	2.68	2.74	1.35	2.45	5.21	4.35	7.95	41.94
1857	0.61	5.80	3.34	1.90	2.75	0.90	4.67	6.60	1.88	1.95	2.92	1.53	34.85
1858	1.60	3.80	2.20	5.87	8.40	6.67	7.30	4.12	6.10	4.95	4.54	2.90	58.45
1859	0.44	3.89	5.01	3.70	7.49	5.82	2.93	1.70	1.80	0.85	1.33	1.00	35.96
1860	1.17	0.43	0.55	1.67	1.42	3.66	4.03	2.30	2.76	1.00	2.09	4.02	25.10
1861	1.50	2.87	4.50	3.93	3.05	1.72	2.65	2.80	3.90	7.20	2.60	2.10	44.23
1862	4.00	2.50	9.20	7.00	2.65	6.74	3.45	7.25	4.50	2.85	1.32	1.70	53.16
1863	1.70	1.50	2.00	1.52	1.89	0.91	2.45	4.15	2.41	3.54	1.44	5.52	26.83
1864	1.05	0.25	2.59	3.43	3.39	5.75	3.25	2.31	3.20	3.11	2.59	1.85	32.77
1865	0.46	2.90	2.76	6.02	1.05	3.69	4.50	4.25	4.23	3.53	0.20	0.62	34.21
1866	3.38	0.58	1.94	3.91	1.18	2.82	5.18	3.36	4.71	1.94	1.01	2.85	32.86
1867	0.75	3.62	1.93	2.34	5.77	4.70	3.24	1.65	3.44	1.00	2.85	0.95	32.24
1868	0.30	0.95	5.55	7.43	7.07	2.50	4.59	2.85	5.18	0.94	2.71	0.84	40.91
1869	1.62	1.63	1.53	2.64	4.47	9.15	8.55	5.35	1.95	1.59	2.47	2.41	43.36
1870	2.04	0.18	3.37	0.38	1.86	0.93	1.05	4.40	4.59	3.95	0.87	0.93	24.61
1871	2.15	2.09	1.88	1.95	1.93	6.71	3.28	6.12	1.07	3.73	2.30	2.90	36.11
1872	0.06	0.30	2.55	3.92	7.57	5.17	2.97	5.84	4.15	0.84	1.30	0.74	35.41
1873	8.49	0.35	1.90	1.45	4.31	1.91	2.61	0.00	1.30	1.44	1.18	3.49	28.43
1874	4.72	2.88	2.39	2.92	1.51	3.70	2.26	3.54	6.58	0.90	2.49	0.88	34.78
1875	0.05	1.50	1.99	0.90	2.65	4.97	6.72	2.56	9.38	1.27	0.63	4.37	37.59
1876	3.23	2.85	3.54	4.00	7.38	4.45	9.15	5.72	6.53	1.84	3.48	1.40	53.57
1877	1.58	2.00	4.82	3.57	2.25	7.44	4.82	4.49	1.25	6.03	3.06	3.01	44.78
1878	0.40	1.56	2.87	2.30	7.49	4.09	3.57	7.43	2.81	4.35	0.77	1.60	39.30
1879	1.20	1.07	2.18	1.81	4.54	3.78	3.40	4.50	2.37	2.85	4.65	1.42	33.63
1880	3.02	1.63	3.62	3.02	3.25	7.22	3.84	4.48	3.17	0.25	0.97	1.31	35.78
1881	1.34	3.49	2.58	2.11	2.43	10.38	3.77	1.36	6.59	7.03	2.83	1.75	45.66
1882	0.84	1.10	2.98	4.00	8.36	8.25	4.55	1.75	1.38	4.29	7.15	2.02	46.67
1883	1.66	4.67	7.55	5.00	6.19	4.77	4.31	1.45	1.19	6.23	3.45	1.45	41.12
1884	1.05	1.40	4.28	2.08	5.57	4.03	5.63	5.77	5.23	6.46	1.57	4.42	45.49
1885	2.38	2.21	0.25	4.07	4.18	4.81	5.03	7.38	2.88	2.80	0.83	2.32	39.14
1886	4.21	1.43	4.16	2.62	5.05	[1.40]	0.32	2.62	3.05	4.70	0.95	0.71	[31.22]
1887	1.88	4.12	1.14	1.26	2.26	2.10	2.90	2.40	3.49	2.24	0.98	3.53	28.30
1888	1.49	0.70	3.10	[1.60]	6.78	3.82	3.39	7.24	2.00	1.50	4.43	4.38	[38.89]
1889	1.43	1.38	0.65	4.28	4.17	5.68	0.69	1.15	3.95	1.04	1.65	1.40	33.47
1890	[1.90]	1.70	[0.40]	1.22	2.81	6.38	.....	.....	.....	.....	.....	.....	.....
Mean..	1.92	2.08	2.71	3.37	4.40	4.78	3.95	4.40	3.80	3.04	2.54	2.35	39.27

Interpolated values are given in brackets.

Mean temperature (degrees Fahr.) observed at Green Springs, Ala., by Profs. H. Tutweiler and J. W. A. Wright, voluntary observers.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1854	43.5	.....	63.2	60.1	.....	80.2	79.2	82.2	75.0	[61.8]	61.6	[43.8]	.....
1855	47.0	43.4	56.3	72.6	80.2	80.2	79.2	81.2	[78.9]	73.7	64.8	53.4	65.6
1856	35.0	47.0	[56.5]	67.8	73.4	79.7	81.2	78.3	72.4	59.4	57.3	50.2	[62.9]
1857	50.1	43.7	56.4	63.2	70.5	76.5	79.3	78.1	73.9	66.2	44.1	51.7	61.7
1858	43.9	53.5	61.7	61.7	73.3	77.2	78.7	77.8	77.4	60.2	57.1	42.9	63.5
1859	.....	.....	.....	.....	.....	83.7	78.2	73.8	.....	61.5	49.7	42.8	.....
1860	[43.4]	[49.2]	.....	.....	.....	76.2	.....	78.0	63.0	62.0	51.9	44.0	.....
1861	42.7	54.2	54.0	62.6	66.9	76.3	79.1	78.7	70.8	63.7	55.3	53.6	63.7
1862	42.6	48.1	60.7	64.8	68.4	77.7	79.4	77.3	73.2	61.4	46.8	42.9	61.9
1863	46.9	47.8	52.6	60.5	68.2	75.8	80.4	80.6	71.2	56.1	49.4	44.1	61.1
1864	47.6	47.1	51.1	50.4	68.8	75.4	79.5	80.2	73.9	63.6	52.1	42.4	61.8
1865	46.8	51.7	58.0	64.0	68.7	78.6	83.0	81.9	74.4	66.4	53.9	48.4	64.6
1866	39.4	49.1	50.4	68.2	71.2	79.2	82.4	83.2	77.0	62.3	49.3	40.7	62.7
1867	41.0	51.0	54.0	62.3	71.3	72.1	79.0	70.8	71.6	57.5	48.9	44.1	60.8
1868	44.3	50.2	57.6	68.1	70.9	72.9	80.6	83.0	76.6	62.2	55.0	48.8	63.4
1869	43.2	44.7	55.8	69.3	71.9	76.2	84.3	76.2	74.3	56.4	56.8	53.1	62.7
1870	50.0	50.8	51.2	63.0	69.9	76.2	80.8	78.4	74.6	60.6	49.1	37.2	61.8
1871	43.7	48.7	51.8	61.7	66.5	77.6	80.4	78.0	73.1	62.1	48.9	48.2	61.9
1872	41.3	45.5	60.0	64.7	78.2	77.0	83.9	81.3	74.9	64.0	54.7	41.5	63.9
1873	42.9	43.8	66.6	60.0	69.4	73.9	79.3	74.0	70.7	64.7	54.3	49.9	61.6
1874	53.8	49.0	55.9	63.6	71.5	74.2	79.8	78.6	74.0	62.7	48.4	42.8	62.9
1875	42.1	48.8	51.9	62.4	73.3	79.5	81.2	81.1	76.4	69.5	54.3	52.5	64.4
1876	53.2	56.6	60.8	65.4	68.0	79.0	77.0	71.9	72.5	68.5	52.4	42.5	64.4
1877	46.1	54.2	53.5	64.2	68.3	78.2	82.8	79.8	75.1	70.0	55.4	50.1	64.8
1878	37.6	52.2	57.0	61.0	71.3	73.5	80.0	77.3	76.5	68.4	49.8	48.7	62.8
1879	44.0	44.9	51.0	65.7	69.0	79.0	78.9	80.2	75.0	61.5	55.0	47.0	62.6
1880	39.0	45.0	57.2	63.6	71.0	76.1	77.3	77.5	77.7	67.4	54.4	45.8	62.9
1881	45.0	49.4	54.8	66.3	72.4	78.3	81.0	79.4	76.6	62.7	52.8	45.4	64.5
1882	46.0	51.0	53.4	66.0	68.7	77.0	84.0	79.7	71.2	62.0	55.0	45.6	63.3
1883	46.4	47.4	55.0	63.7	69.2	75.6	79.5	79.9	71.4	60.6	50.8	57.4	63.1
Mean..	44.2	49.7	55.4	63.1	70.7	76.7	80.4	78.9	83.9	63.0	52.6	46.4	62.9

Observations made at Green Springs from 1854 to 1884; Greensborough, 1885 to 1886; and Livingston, 1887 to 1889, inclusive.

Precipitation (inches and hundredths) observed at Fort Totten, N. Dak., by assistant surgeons, U. S. Army, and Signal Service observers.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1869	.....	.....	.....	.....	.....	.....	.....	2.62	1.18	0.03	0.40	0.00	.....
1870	0.00	0.01	1.00	0.40	5.35	0.59	2.33	0.82	2.04	1.32	1.10	0.24	15.20
1871	1.80	0.74	0.96	1.87	1.04	5.91	0.06	1.95	0.41	0.30	0.93	1.12	17.03
1872	0.74	0.26	3.40	3.15	1.10	1.66	4.00	2.48	0.60	0.78	0.64	0.19	19.00
1873	1.16	1.32	0.87	0.57	3.75	4.68	1.03	2.34	0.70	0.06	0.77	0.05	17.30
1874	0.38	0.03	0.49	0.62	1.43	2.52	0.98	6.34	1.92	0.40	1.41	0.19	16.71
1875	0.51	0.80	0.24	1.54	2.77	6.25	1.62	3.44	2.21	1.66	0.75	0.38	22.17
1876	0.12	0.42	1.52	0.42	3.92	1.10	2.33	2.48	1.08	0.00	0.53	0.48	14.40
1877	0.20	0.00	0.90	0.47	4.41	5.12	5.16	0.00	0.19	0.58	0.51	1.30	18.84
1878	0.00	0.30	3.70	5.19	2.38	2.90	2.82	0.70	1.10	2.46	0.70	0.20	22.45
1879	0.17	0.70	0.10	0.14	3.80	3.90	2.16	3.80	1.30	1.50	0.20	1.44	19.15
1880	0.40	0.60	0.30	0.24	4.38	3.17	2.94	3.80	0.38	0.55	T.	0.28	22.24
1881	0.16	1.34	0.28	0.30	2.05	3.88	0.10	2.24	2.46	0.24	5.10	1.87	18.15
1882	0.48	0.30	2.04	2.40	1.30	4.30	1.08	0.31	0.35	3.89	1.73	0.40	18.58
1883	0.92	0.79	0.19	1.71	1.79	1.42	1.84	1.46	1.40	4.10	0.73	2.84	17.93
1884	0.28	0.58	0.68	2.38	1.20	2.50	3.05	3.72	1.32	0.92	0.25	0.47	17.30
1885	0.17	0.25	0.15	3.07	1.70	3.45	5.83	1.91	0.13	0.66	0.90	0.47	18.69
1886	0.91	0.79	0.72	0.85	2.75	2.79	1.29	1.06	0.87	1.16	0.65	0.38	14.22
1887	0.70	0.50	0.56	0.63	1.57	5.57	4.62	2.36	0.59	0.98	0.40	0.87	19.35
1888	0.63	0.09	0.79	0.65	0.60	7.41	3.34	0.90	0.47	0.87	2.27	0.11	16.13
1889	0.24	0.64	0.16	0.78	0.62	1.56	2.05	2.69	1.62	T.	0.19	0.00	10.55
1890	0.35	0.60	0.27	1.97	0.79	6.84	1.25	2.37	.....	.....	.....	.....	.....
Mean..	0.49	0.53	0.92	1.40	2.32	3.69	2.37	2.49	1.00	1.07	0.86	0.55	17.6

Table of miscellaneous meteorological data for August, 1890—Signal Service observations.

Stations and districts.	Elevation above sea-level, feet.	Pressure, in inches.		Temperature of air, in degrees Fahrenheit.							Mean temperature of the dew-point.		Mean relative humidity, per cent.		Precipitation, in inches.		Departure from normal precipitation.		Wind.			Cloudless days.		Partly cloudy days.		Cloudy days.		Days with rainfall.		Average cloudiness, tenths.		Precipitation data since opening of station.			
		Mean actual.	Mean reduced.	Monthly range.	Monthly mean.	Departure from normal.	Maximum.	Mean maximum.	Minimum.	Mean minimum.	Greatest daily range.	Least daily range.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.	Departure from normal precipitation.	Total movement, miles.	Prevailing direction.	Maximum velocity.		Date.	Cloudless days.	Partly cloudy days.	Cloudy days.	Days with rainfall.	8 a. m.	8 p. m.	Length of record, years.	Greatest for month.	Year.	Least for month.	Year.			
																			Miles per hour.	Direction.															
New England.																																			
Eastport.....	53	29.90	29.96	1.01	67.4	+0.1	80	67.8	53	55.1	25	4	55.4	85.8	5.35	+2.00	5,658	s.	38	se.	27	6	8	17	14	4.2	4.8	18	5.85	1877	0.49	1883			
Green Mountain..	1,541	28.37	29.99	0.85	60.2	+0.4	79	65.6	46	54.8	20	4	53.0	82.2	6.15	+0.72	16,947	w.	74	se.	27	7	10	14	11	2.9	4.0	20	7.90	1877	0.36	1883			
Portland.....	99	29.88	29.98	0.68	65.9	+1.1	87	72.9	49	58.9	23	3	59.4	82.8	2.99	+0.76	3,658	nw.	36	nw.	27	9	15	7	11	5.7	4.9	4	6.33	1887	1.72	1889			
Manchester.....	247	29.74	30.00	0.80	66.6	+0.1	87	76.4	46	56.9	30	5	56.8	75.2	4.57	+0.76	3,597	nw.	24	nw.	27	10	14	7	13	5.3	3.8	4	15.39	1890	2.30	1876			
Mt. Washington..	6,279	23.88	30.00	0.73	44.8	+0.1	63	49.9	27	39.7	22	3	40.2	87.0	15.39	+0.76	20,580	nw.	61	sw.	27	3	14	13	13	2.7	4.9	4	6.98	1880	1.59	1889			
Mount Killington.	4,056	26.09	30.00	0.62	51.6	+0.1	73	57.6	34	45.0	19	5	46.2	87.2	7.97	+0.76	17,183	nw.	61	sw.	27	3	14	13	13	2.7	4.9	4	6.98	1880	1.59	1889			
Northfield.....	872	29.08	30.00	0.63	62.4	+0.1	88	72.9	36	52.0	37	7	55.7	79.8	6.98	+0.76	5,827	sw.	36	sw.	27	7	17	13	12	6.6	3.5	4	10.68	1872	0.39	1883			
Boston.....	125	29.88	30.01	0.73	68.9	+1.1	89	76.1	50	61.7	35	6	59.2	75.0	3.37	+0.98	5,370	sw.	27	sw.	27	7	17	13	12	6.6	3.5	4	11.05	1886	0.57	1888			
Nantucket.....	14	30.02	30.03	0.58	67.7	+0.1	80	72.7	55	62.7	16	3	62.8	85.4	2.81	+0.25	8,359	sw.	34	sw.	27	11	13	7	10	6.4	4.0	4	10.84	1887	0.65	1888			
Wood's Holl.....	22	30.00	30.03	0.54	67.8	+0.1	80	72.4	55	63.1	13	3	64.2	87.3	4.65	+0.25	9,445	sw.	48	sw.	27	10	15	3	8	3.3	3.3	13	10.84	1887	0.65	1888			
Vineyard Haven..	27	30.00	30.03	0.66	70.1	+0.1	85	77.1	55	63.1	22	5	63.0	86.6	2.09	+1.15	10,073	sw.	45	sw.	27	10	13	8	11	5.6	3.2	10	6.41	1884	1.32	1888			
Block Island.....	27	30.00	30.03	0.66	70.1	+0.1	85	77.1	55	63.1	22	5	63.0	86.6	2.09	+1.15	10,073	sw.	45	sw.	27	10	13	8	11	5.6	3.2	10	6.41	1884	1.32	1888			
Narragansett Pier	22	30.00	30.03	0.66	70.1	+0.1	85	77.1	55	63.1	22	5	63.0	86.6	2.09	+1.15	10,073	sw.	45	sw.	27	10	13	8	11	5.6	3.2	10	6.41	1884	1.32	1888			
New Haven.....	107	29.90	30.01	0.69	69.1	+0.1	85	76.6	47	61.6	26	9	62.4	81.6	2.67	+2.99	4,798	nw.	27	sw.	27	5	11	15	10	6.3	3.5	18	12.99	1874	0.26	1882			
New London.....	47	29.95	30.00	0.68	69.6	+0.6	83	75.6	51	63.5	18	4	61.8	79.6	2.43	+2.84	4,928	sw.	34	sw.	27	4	21	6	11	7.0	6.5	20	16.44	1874	0.48	1876			
Mid. Atlantic States.																																			
Albany.....	85	29.92	30.01	0.74	70.6	+0.4	91	79.1	50	62.0	25	4	58.7	73.2	5.66	+2.10	5,728	se.	30	se.	27	3	19	9	14	7.0	5.5	17	7.58	1885	0.53	1876			
New York City...	185	29.83	30.03	0.67	72.3	+0.3	89	78.9	51	65.7	19	4	62.2	76.8	4.06	+0.72	7,288	nw.	34	sw.	27	3	17	11	13	6.1	4.4	20	10.42	1875	1.18	1886			
Harrisburg.....	377	29.65	30.05	0.51	71.2	+0.4	88	79.3	50	63.1	24	6	60.6	72.6	5.70	+0.72	4,783	sw.	36	nw.	27	10	13	8	15	5.1	4.4	3	6.28	1888	3.58	1889			
Philadelphia.....	117	29.93	30.05	0.58	73.6	+0.4	94	81.3	51	66.0	22	5	60.9	76.0	3.36	+1.37	7,091	nw.	41	sw.	27	4	14	13	13	6.3	3.5	17	11.49	1873	0.66	1877			
Atlantic City.....	53	29.99	30.04	0.55	71.0	+0.9	90	75.9	48	66.0	21	4	65.7	84.0	7.51	+2.69	7,553	sw.	36	sw.	27	14	12	5	11	3.5	5.0	20	9.49	1873	1.23	1874			
Baltimore.....	76	29.95	30.04	0.50	74.1	+1.0	95	81.6	51	66.6	23	7	63.3	72.4	6.44	+1.99	3,631	sw.	26	n.	22	9	15	8	15	4.3	5.0	20	12.47	1882	0.64	1877			
Washington City..	112	29.94	30.06	0.48	73.6	+1.4	95	82.0	49	68.1	25	9	63.7	78.0	5.50	+0.98	4,314	sw.	33	sw.	27	8	15	8	14	4.8	5.0	20	16.82	1887	2.01	1884			
Cape Henry.....	685	29.35	30.07	0.44	74.0	+2.0	93	83.8	47	64.1	28	12	62.3	73.0	3.81	+3.23	2,831	sw.	27	nw.	22	7	16	8	13	5.2	6.0	20	10.37	1873	0.30	1881			
Lynchburg.....	43	30.04	30.08	0.47	75.2	+1.8	93	82.6	48	67.9	21	5	66.6	81.9	6.21	+3.27	5,753	sw.	30	se.	27	6	10	15	6	17	4.8	6.0	20	10.37	1875	1.74	1881		
S. Atlantic States.																																			
Charlotte.....	808	29.27	30.10	0.47	75.3	+1.7	92	84.8	57	65.8	25	12	64.8	78.2	5.35	+0.08	3,069	sw.	20	n.	7	15	12	4	9	5.8	3.5	12	10.57	1880	1.15	1881			
Hatteras.....	11	30.08	30.10	0.54	76.0	+1.0	84	80.3	65	71.7	12	6	70.0	83.8	8.51	+1.89	9,106	sw.	36	n.	11	17	10	4	14	3.6	3.5	16	16.30	1880	1.06	1881			
Kitty Hawk.....	388	29.68	30.09	0.42	74.5	+1.6	92	83.4	52	65.6	24	11	65.7	79.6	5.83	+0.74	3,336	sw.	16	n.	3	12	13	6	12	4.4	4.7	4	10.80	1887	4.05	1888			
Raleigh.....	388	29.68	30.09	0.42	74.5	+1.6	92	83.4	52	65.6	24	11	65.7	79.6	5.83	+0.74	3,336	sw.	16	n.	3	12	13	6	12	4.4	4.7	4	10.80	1887	4.05	1888			
Southport.....	78	30.01	30.09	0.46	76.4	+2.6	93	83.6	57	67.9	26	10	68.6	81.4	6.48	+1.34	4,573	sw.	30	nw.	22	6	15	10	17	4.8	4.4	20	11.37	1879	4.04	1874			
Wilmington.....	52	30.04	30.09	0.39	79.8	+1.2	93	86.2	57	67.9	26	10	68.6	81.4	6.48	+1.34	4,573	sw.	30	nw.	22	6	15	10	17	4.8	4.4	20	11.37	1879	4.04	1874			
Charleston.....	183	29.92	30.11	0.40	79.3	+1.7	96	89.5	59	69.1	27	10	67.8	75.6	2.26	+2.46	1,998	se.	15	sw.	1	11	16	4	6	5.6	4.0	20	9.18	1885	3.93	1889			
Columbia.....	87	30.01	30.10	0.37	80.4	+1.6	94	86.4	63	70.7	21	9	69.4	79.8	2.80	+4.91	3,947	sw.	22	sw.	1	12	16	3	12	3.4	4.1	20	18.13	1871	1.89	1887			
Augusta.....	43	30.04	30.10	0.37	80.4	+1.6	94	86.4	63	70.7	21	9	69.4	79.8	2.80	+4.91	3,947	sw.	22	sw.	1	12	16	3	12	3.4	4.1	20	18.13	1871	1.89	1887			
Savannah.....	87	30.01	30.10	0.37	80.4	+1.6	94	86.4	63	70.7	21	9	69.4	79.8	2.80	+4.91	3,947	sw.	22	sw.	1	12	16	3	12	3.4	4.1	20	18.13	1871	1.89	1887			
Jacksonville.....	43	30.04	30.10	0.37	80.4	+1.6	94	86.4	63	70.7	21	9	69.4	79.8	2.80	+4.91	3,947	sw.	22	sw.	1	12	16	3	12	3.4	4.1	20	18.13	1871	1.89	1887			
Florida Peninsula.																																			
Jupiter.....	28	30.05	30.08	0.29	80.4	+1.6	94	86.4	63	70.7	21	8	74.6	81.0	8.70	+2.61	5,074	se.	25	w.	1	9	18	6	16	5.1	4.3	3	8.70	1890	4.44	1888			
Key West.....	22	30.04	30.06	0.24	81.8	+3.2	99	86.9	70	70.7	16	2	73.4	75.5	2.25	+2.61	5,074	se.	24	n.	1	9	16	6	13	0.4	4.4	20	9.40	1889	2.00	1888			
Miccosukee.....	36	30.05	30.09	0.30	80.6	+0.9	93	89.1	67	72.0	23	9	72.8	83.5	8.87	+2.61	5,074	se.	23	se.	5	5	18	7	19	2.5	3.3	2	.....	.....	.....	.....
Tampa.....	36	30.05	30.09	0.30	80.6	+0.9	93	89.1	67	72.0	23	9	72.8	83.5	8.87	+2.61	5,074	se.	23	se.	5	5	18	7	19	2.5	3.3	2	.....	.....	.....	.....
Titusville.....	44	30.05	30.09	0.32	80.2	+1.4	94	86.3	70	74.1	17	7	74.2	84.0	3.74	+1.04	8,860	se.	32	no.	12	12	12	7	17	3.4	4.4	4	4.40	1888	2.47	1887			
Eastern Gulf States.																																			
Atlanta.....	1,139	28.92	30.10	0.36	75.2	+1.8	90	83.7	59																										

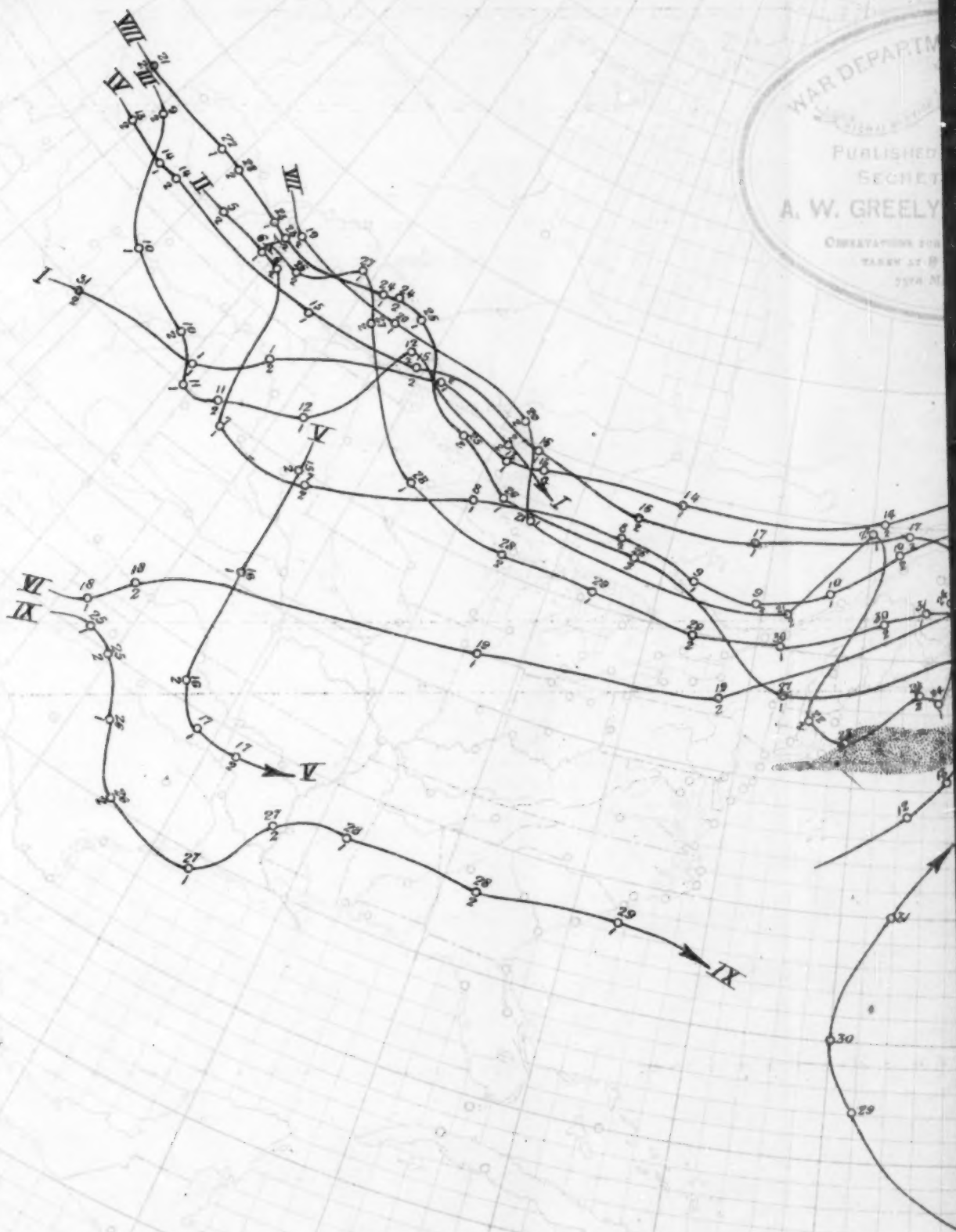
Table of miscellaneous meteorological data for August, 1890—Signal Service observations—Continued.

[illegible]

NOV.—The data at stations having no departures are not used in computing the district averages. Letters of the alphabet denote number of days missing from the record.
* Two or more directions, dates, or years. † Precipitation is measured at the Boston Water Works. ‡ Received too late to be considered in departures, etc. ‡ Not received.
Corrections: Mount Washington, N. H., July, 1890, total movement of wind should be 16,270*f*, instead of 15,800*g*; Sault de Ste. Marie, Mich., July, 1890, total movement of wind should be 5,067, instead of 5,057.

Chart I. Tracks of Areas of

Form 1001-15 10034



NOTES.

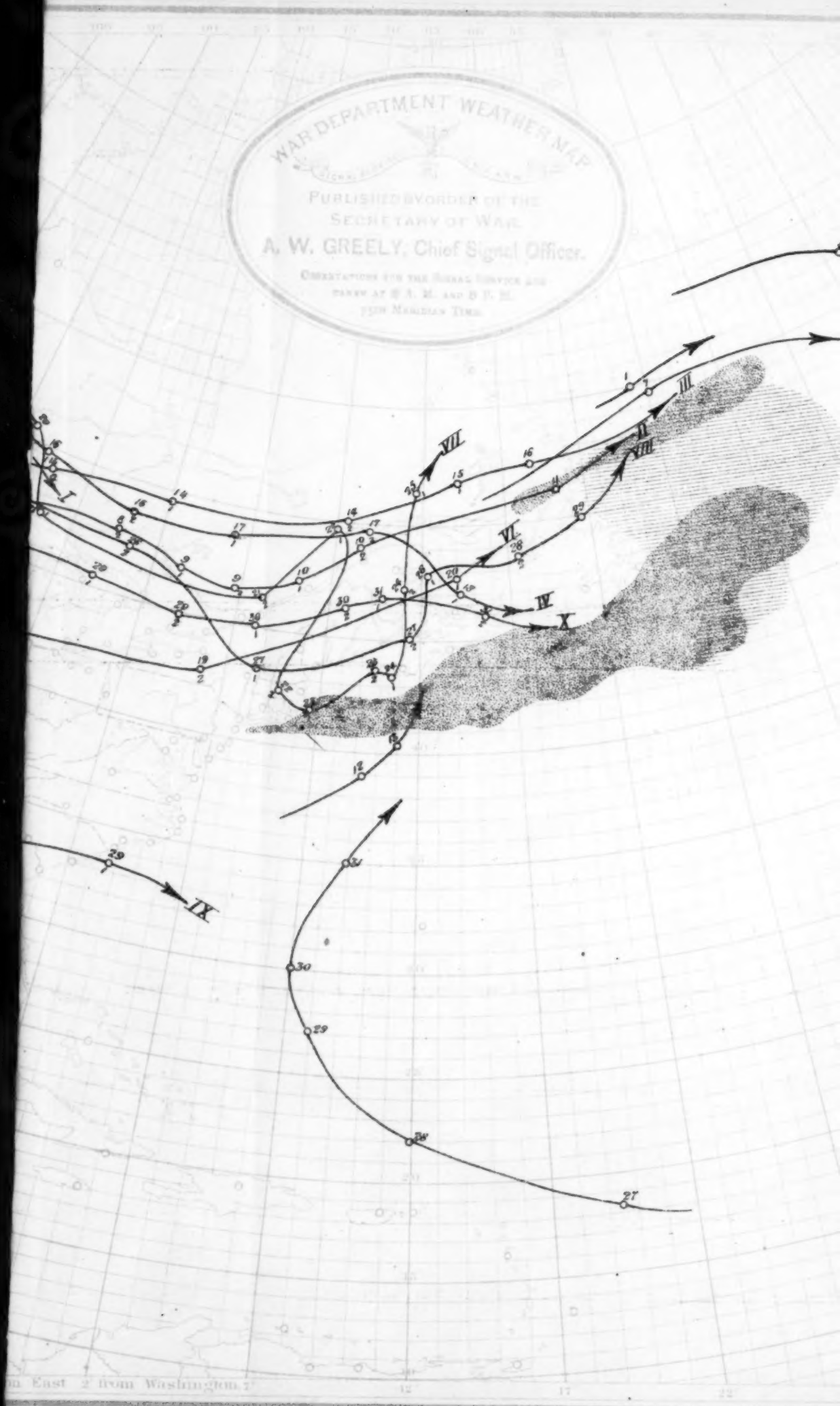
The Roman letters show number and order of areas of low pressure. The figures above the lines show the days of the month, those below (1 and 2) indicate, respectively, the 8 a. m. and 8 p. m., 75th meridian time, observations.

The dotted shading () indicates fog belts.

The ruled shading () indicates the position in which field-ice or icebergs were observed.

West from 2 Washington East 2 from Washington

Chart I. Tracks of Areas of Low Pressure. August, 1890.



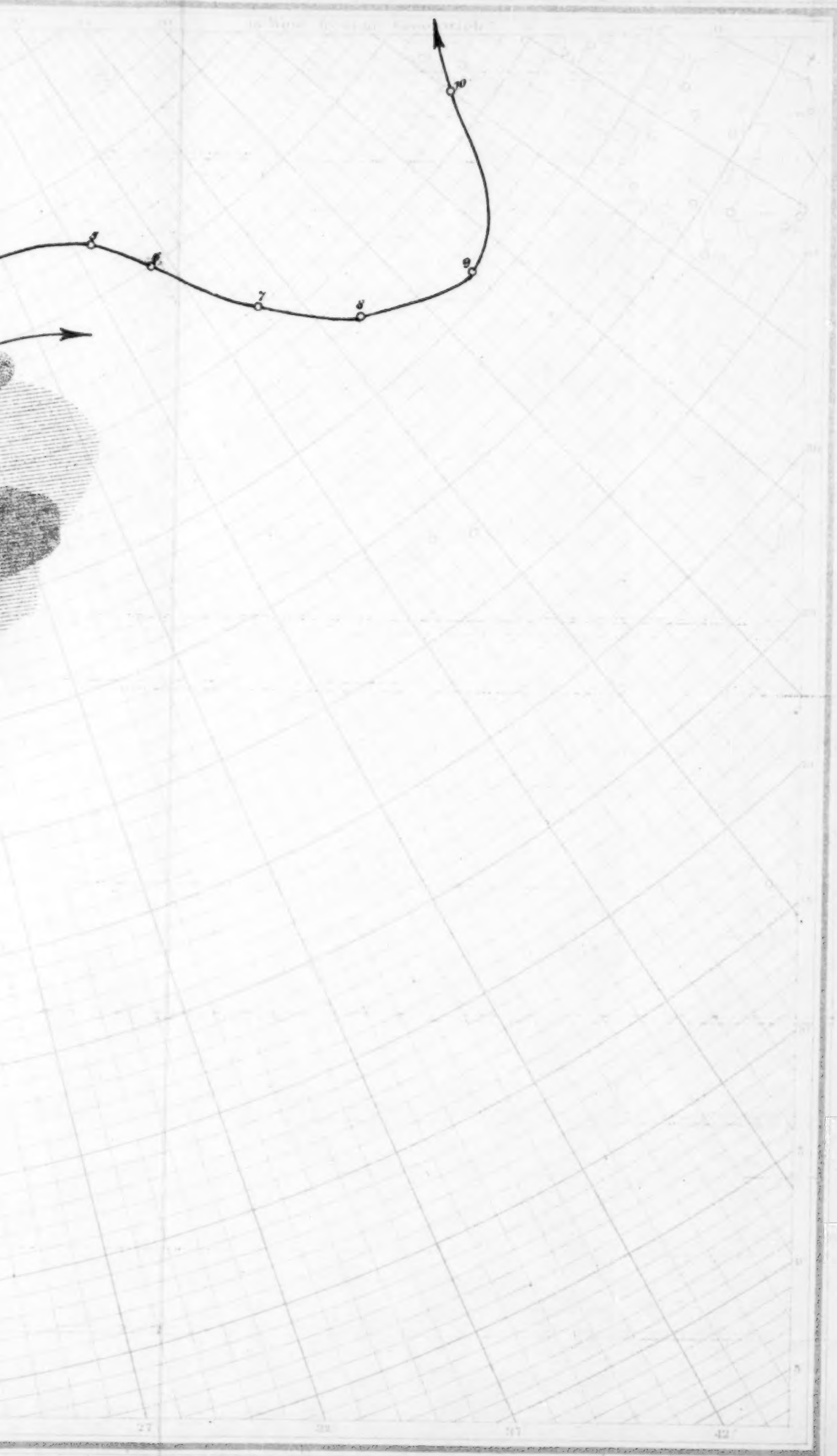




Chart II. Isobars, Isotherms, and Winds, August, 1890.

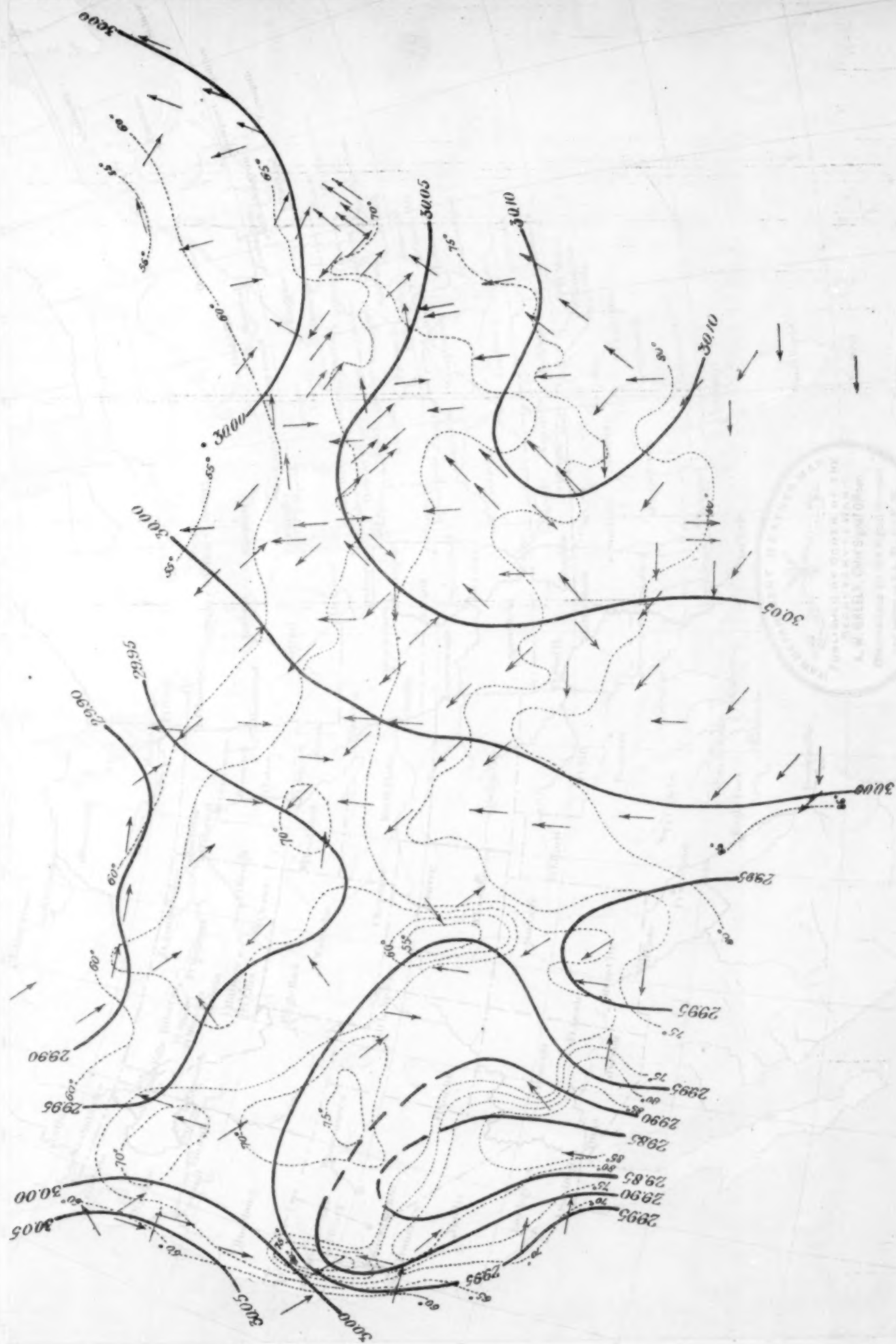




Chart III. Precipitation, August, 1890.

